AMERICAN DYESTUFF REPORTER

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Dyeing of Tubize (Rayon) Fabrics—

The Properties of the Yarn—Importance of Scouring—Tension as a Cause of Variations —No Specific Method Best

By B. L. HATHORNE

"TUBIZE" is yarn made by the nitro cellulose process. The name is derived from a little town in Belgium where Count Chardonnet erected the world's first artificial silk plant. The Tubize sold in America is made in Hopewell, Va., by the Tubize Artificial Silk Company of America, under the direction of Mr. Juer, one of the co-workers of Count Chardonnet, the discoverer of artificial silk.

The problems encountered in dyeing the various mixed fabrics are so many and varied and so interlocked that it is impossible to do them justice in one short article. I will, therefore, confine myself to a consideration of the problems encountered in dyeing fabrics made entirely of Tubize.

Understand the Properties

The properties of the yarn and its affinity for the various dyestuffs should be thoroughly understood by those responsible for properly dyeing it.

(1) It is the strongest of the synthetic yarns and not only stands a hard boil, but it is benefited by it.

(2) Its affinity for the general run of direct cotton colors lies about midway between scoured raw cotton and highly mercerized cotton.

(3) All dyestuffs do not exhibit the same dyeing properties on Tubize as do the same dyes on cotton. Failure to properly appreciate this fact sometimes causes trouble.

(4) It has considerable affinity for basic dyes, and can be dyed with basic colors in light to medium shades without a previous mordanting.

(5) Some acid dyestuffs, especially those of the triphenyl-methane group, have a marked affinity for Tubize in light shades and give light bright dyeings of good fastness to washing.

(6) Small amounts of mild acids and alkalies if removed from the goods before drying may safely be used.

(7) Peroxide bleaching, properly controlled, will not weaken the fiber, but care should be taken that the temperature does not exceed 150° F., when peroxide is used.

(8) A properly controlled permanganate bleach will give no weakening.

(9) Sodium hypochlorite, though not to be recommended, can be used successfully for bleaching Tubize but should be carefully handled.

Cleansing Important

The necessity for a thorough cleansing of the goods and complete removal of all impurities cannot be overemphasized. It is not at all uncommon for circular knit goods to come to the dyehouse containing 15% by weight of oil, and only too often a low grade mineral oil is used. In woven goods the situation is just as bad as the materials used in warp sizing are often very difficult to remove. In fact, I know of one firm using linseed oil as an ingredient of their warp size.

It is impracticable to attempt to outline methods for properly scouring all types of Tubize fabrics on all types of machines. I want to point out, however, that goods run a short time in a hot soap bath are *not* properly scoured. At least three-quarters of an hour's boil is essential, even for goods containing easily removable oil or size. Sufficient soap should be used to emulsify and hold in emulsion all the oil. Soap should be added to the first rinse of heavily oiled goods to prevent a "breaking" of the oil-soap emulsion within the goods before the same is completely rinsed out. The improved dyeing results obtained after a thorough scour will repay the dyer for the time and materials used.

Tension as a Cause of Variations

The biggest problem in the dyeing of all synthetic fibers to-day is to dye every yarn in a given fabric exactly the same shade as every other yarn. The reasons for the variations that occur are so many and varied that in any given case it is usually difficult, and often impossible, to determine the cause after the goods have been dyed. One cause of trouble is uneven tension applied during manufacture of the goods. Only too often the tension is uneven and one or more strands of yarn are stretched beyond their elastic limit, thus changing the physical structure of the yarn, its luster and dyeing properties.

Uneven oiling, improper scouring, hasty dyeing, and the use of improper dyestuffs all contribute their share of trouble.

The great variety of fabrics and the equally great variation of conditions under which the same must be dyed, as well as the variation in types of machines available, make it impossible to give a specific method which will work equally well under all conditions. In every case, however, the underlying principle is the same, and the following points should be borne in mind:

(1) Suitable dyestuffs should be used.

(2) The goods should be boiled.

(3) Soap or soluble oil should be avoided. When the depth of shade makes salt essential apply it at the boil.

It is obviously poor taste to mention specific dyes from specific manufacturers in an article of this sort, but the author will gladly furnish names, Colour Index numbers, and other information regarding proper dyestuffs to use for any given shade or shades desired by anyone interested in the dyeing of Tubize.

SOME NEW FIBERS WHICH MAY BE USED INDUSTRIALLY

THE ever-increasing demand of the textile industries for fibers of all kinds has caused the study of the possibilities for use as textiles of the fibers of many different vegetables. A number of plants have given interesting results from this point and may possibly be used industrially. They are:

Kendir, a plant whose origin is in Turkestan and whose branch resembles a reed. The fibers of the branches are very resistant and absolutely immune from rotting. They are easily dyed. The fiber of *kendir* may advantageously replace American or Egyptian cotton in all its applications. However, the economic organization of its harvest still remains to be done as well as the technical applications.

The *Malva Cubana*, a plant whose habitat is Cuba and which furnishes fibers that are useful for the manufacture of sacks. The employment of this textile permits the manufacture of sacks at prices much below those that are made from Calcutta jute.

Kenaf, a plant whose origin is Caucasia and which is also possible to use for the manufacture of sacks, cords, strings and packing cloth and which may replace jute.

Kapok, a plant whose origin is Africa and which is used for the filling of cushions, pillows, mattresses, life savers, etc., is already well known. Its fibers can be used only imperfectly in spinning and the manufacture of fabrics. However, its use is interesting when used together with cotton. With a half mixture lighter fabrics may be obtained but which are not so solid as those obtained with cotton. *Kapak* is especially abundant in French West Africa.

Sikal is a plant whose origin is in the Sudan where French exploitations exist. It furnishes fibers that are from 1 meter to 1.50 meters in length.

Guinea Hemp, whose steeping takes place in the running waters of the plains, furnishes a glossy white fiber which is very resistant.

It is interesting to note that these last three plants come from French colonies where they may become the object of prosperous plantations and of a methodic exploitation.

Address by the Perkin Medalist

Dr. Robert Schmidt Reviews His Career on the Occasion of Receiving Highest Honor

[EDITOR'S NOTE.—*Presentation of the Perkin Medal for distinguished work in the field of dyeing and dyestuffs was made at the Forty-fourth Annual Meeting of the Society of Dyers and Colourists held recently in Manchester, England. Dr. Robert E. Schmidt, of Eberfield, was the recipient of this, the highest honor bestowed upon chemists by the society, and in replying to the toast proposed to him by the president of the society, Dr. Herbert Levenstein, he made a brief address which, because of its unusual interest, we take pleasure in reprinting.*]

MR. PRESIDENT, Sir Josiah Stamp, and Gentlemen:

For the kindly and highly flattering words in which you have proposed the toast to me I thank you from the bottom of my heart. Especially are my thanks due to you for the high honor extended to me by the presentation of the medal bearing the name and image of the renowned man who founded the synthetic dyestuffs industry, one of the greatest, most interesting, and fruitful industries which has ever existed, considered either from the technical or scientific point of view.

Personally I have every reason to be grateful to William Henry Perkin, for he was a founder of the alizarine industry. His part in the synthesis of alizarine, and in its technical development, is well known and recognized, and his pioneer work in its manufacture was the foundation upon which the group of anthaquinone dyestuffs largely has been built. It is well known that this group in the course of years has undergone enormous expansion, and includes not only some of the brightest but many if not most of the fastest dyestuffs. Perkin's discoveries have, however, been more far reaching in their effect than is apparent at first sight.

With the expansion of the dyestuffs industry large works were established and efficient laboratories were erected employing hundreds of chemists who were able to continue and expand their university training, and eventually apply the knowledge they acquired to industry. Each large color works became within itself a technical institute differing little from the state schools of technology except in the amount of money at its disposal. From such research centers originally

created solely for the development of the dyestuff industry great discoveries have emanated from time to time dealing with a variety of problems. As instances I would mention the technical production of sulphuric acid by the contact process, that of solid and stable hydrosulphite, the fixation of the nitrogen of the atmosphere in the form of ammonia and nitric acid, and the liquefaction of coal; achievements rendered possible through the scientific, technical and financial resources created by the dyestuff industry, and it was William Henry Perkin who provided the first impulse to the dyestuff industry.

Honoring Fruits of Labor

One feature in connection with the honor conferred upon me which affords me especial pleasure is that being a stranger in a strange land you honor in me the fruits of my labor more than myself in person. Anonymously, I have many friends in your country, for I look upon everyone who has used dyestuffs of my discovery as my good friend. Per contra, I have probably always been a good friend of yours, having supplied you with dyestuffs of regular quality at moderate prices.

Sir Josiah Stamp, in his reference to me as a chemist, has magnified my achievements unduly, but nevertheless it may interest you to hear from me a few words as to what I consider the secret of my success. Inherited talent or instinct is not a thing of which one should be inordinately proud. The great thing is to know how to use one's talent and to possess the will to that end. Work has always been one of my greatest pleasures, and is so still, even to-day. Paradoxical as it may appear, the qualities which lead quickest to success are patience and tenacity. It has never been my habit to strive after some great objective, but in spite of that, or perhaps because of it, it has been my happy lot to achieve more than I intended. I have always approached any problem unprejudiced, and without losing too much time in deliberation or consultation of old authorities have taken an unconventional course. My practice has been to spend most of my time in my laboratory, and not to devote too much time to reading literature. I have preferred to make voyages of discovery on my own rather than to sit at home reading the descriptions of other travelers. Always an optimist, I am still more so than ever after forty-one years' activity as a technician. It has never occurred to me that I am too old for the laboratory, or to make discoveries, and this has kept me young. I have never sought or run after fortune, but have kept my eyes open, and whenever luck has brushed past we have grasped it and held on to it.

Reverting once more to inherited talent—which many young men possess but fail to develop for various reasons and sometimes from lack of encouragement by the right people—on this day, memorable for the honor you are doing me, I remember with gratitude the men I have to thank that my inherent abilities were so developed that I was enabled to use them to advantage. In the forefront of my thoughts are my parents, who lived in modest circumstances, but did everything to give me a good education and provided me with an example of loyalty to duty. My teachers come next in my thoughts, some of whom I cannot recall, but suffice it if I mention here two names, George Lunge and F. P. Treadwell. In my early years Lunge was a fatherly friend to me, and I owe very much to him, and maintained my friendship with him to the end of his busy life. It was under Lunge that I earned my first £5 in the year 1884, and although since then larger sums have come my way none afforded me so much pleasure as the £5 mentioned.

Studying Under Knecht

One other to whom I refer is well known to all of you, Edmund Knecht, who was my warm friend to the end of his life. When I entered the Technical High School at Zurich in 1881, Knecht was then assistant to Victor Meyer, and under him my first lessons in chemistry were learned. Edmund Knecht was to me in every sense a chemical foster mother, and we spent much time together, and I well recollect a fortnight's walking tour with him many years ago through the Graubundner Alps. On this occasion we had with us a field flask which was filled every morning with Kirschwasser but by evening was invariably empty. Both were equally responsible for the production of this daily vacuum. My last meeting with Knecht was in Zurich a few months before his death, when, together with Professor Fierz-David, we passed many joyous hours together. The only shadow falling across my path in to-day's proceedings is that my friend is no longer with us.

Before concluding, let me mention that remarkable man, Carl Duisberg, and his conviction that the soundest basis of the chemical industry is intensive scientific research in which I have always concurred and received his support.

It was always my practice to keep in close personal touch with dyestuffs consumers, dyers and colorists, and in this way keep myself informed of the wants and requirements of dyers and calico printers. I recall with satisfaction my long years of association with my friend, Mr. Francis E. Craven, whose opinion I always value highly. He possesses the rare virtue of detecting the good properties of a new dyestuff and not only its bad ones. With most colorists the reverse is the case.

In conclusion, again I thank you warmly and sincerely for the generous manner in which you have honored the toast.

LARGEST CLASS LEAVES LOWELL TEXTILE INSTITUTE

Diplomas Awarded to Forty-three at Thirtieth Annual Commencement

THE largest class of students ever graduated from the Lowell Textile Institute received diplomas and degrees at the school's thirtieth annual commencement held in Southwick Hall last Tuesday morning, June 19. Degrees were conferred upon twenty-seven of the forty-three graduates and sixteen received diploma awards. The various special prizes, awards and medals that are a regular feature of the commencement were also presented at this time.

An address of welcome by President Charles H. Eames opened the exercises. President Eames reviewed briefly but in an interesting manner the accomplishments of various members of the graduating class during the past year at Lowell, and alluded to the fact that this class had the honor to be the first to receive diplomas inscribed with the new name, "Institute."

An inspiring address was delivered by Charles H. Eglee to the students and the large audience of relatives and friends who attended. Mr. Eglee spoke on "Life."

THE GRADUATES

Arthur G. Pollard, chairman of the trustees of the Institute, conferred degrees and presented diplomas to the following:

Department of Chemistry and Textile Coloring—Robert Burns, James Francis Corbett, William Francis Dolan, Paul Leon Fasig, John Francis Fitzgerald, Stephen Kenneth Ford, John Vincent Killheffer, Benedict Josephus McKay, Harold Hrant Parigian, Francis Rudolph Rodalvicz, Clifford William Sampson, John Francis Shea, Elias Aaron Tarshis, George Chester Ward, E. Maybelle Warren.

Department of Textile Engineering—Clifford Albert Farley, Lawrence William Gottschalck, George Leslie Logan, Edward Perkins McGuire, Raymond Wellington McKittrick, George Gordon Osborne, Kurt Herman Reinhold, William Samuel Russell, Jr., Alvin Briggs Storey, John Chester Westaway, Kenneth Leroy Woodbury, Edward Lawrence Wingate, Jr.

Department of Cotton Manufacture—John Harold Swanson, Francis Putney Wetherbee.

Department of Wool Manufacture—Thomas Francis Connor, Avard Nelson Darby, Arthur Leon Ferris, Wolfred Hyman, Harold Wheeler Joslin, James Joseph Maguire.

Department of Textile Design—Harold Conrad Bauer, John Pottomley, Daniel Joseph Coffey, Sydney Davidson, Maxwell Pearlstein, Jackson Ambrose Shedd, John Smith Stott, Kenneth Edward Strout.

GRADUATES OF THE DEPARTMENT OF CHEMISTRY AND TEXTILE COLORING

Standing, Left to Right—Clifford W. Sampson, George C. Ward, Harold H. Parigian, Stephen K. Ford, Paul L. Fasig, Elias A. Tarshis, John F. Fitzgerald, John V. Killheffer. Seated, Left to Right—William F. Dolan, Francis R. Rodalvicz, E. Maybelle Warren, James F. Corbett, Robert Burns, John F. Shea.

The awards were as follows:

Medal of the National Association of Cotton Manufacturers.—Presented by Russell T. Fisher, B.T.E., awarded to George Gordon Osborne, Montreal, Quebec.

Textile Colorist Award.—A prize of $100 offered by the Textile Colorist, Inc., to the member of the graduating class whose thesis, based upon his personal researches and experiences, is of the greatest practical value to the dyeing, bleaching or textile finishing industries, awarded to John Vincent Killheffer, North Caldwell, N. J.

Edward A. Bigelow Prize.—$100 to the member of the graduating class in the wool manufacturing course who maintains the highest standing throughout the three years, awarded to Wolfred Hyman, Roxbury, Mass.

Edward A. Bigelow Prize.—$50 to the member of the second-year class in the wool manufacturing course who maintains the highest standing during the first two years, awarded to Joseph Johnson Brook, Simcoe, Ont.

Through the generosity of a recent graduate a thesis prize of $20 is available for a senior in the chemistry and textile coloring course, awarded to Maybelle Warren, Billerica, Mass.

Louis A. Olney Book Prizes (in the form of books).—$20 to the regular student in the chemistry and textile coloring course who shall present the best thesis preparatory to graduation, awarded to Clifford William Sampson, Plymouth, Mass.

Ten and five dollars to the students taking the regular chemistry and textile coloring course who shall be considered as having attained the highest and second highest scholarship in second and first year chemistry, respectfully:

Second Year.—First prize, Morris Barsky, Dorchester, Mass.; second prize, Arthur Francis Gallagher, Lowell, Mass.; honorable mention, Willard Alvah Colby, Jr., Bradford, Mass.; Alfred John Carbone, Haverhill, Mass.

First Year.—First prize, Norman Albin Johnson, Deep River, Conn.; second prize, Abraham Lifland, Roxbury, Mass.; honorable mention, Richard Lea Brook, Simcoe, Ont., Stanley Arundel Hall, Haverhill, Mass.

Herbert A. Currier Scholarship.—$50 given by Herbert A. Currier of the Class of 1906 to a student selected by the faculty of the school, the following conditions to be considered in making the selection: Scholastic standing, financial need, and ability in promoting student activities in school life. Awarded to James Oliver Ellis, Chelmsford, Mass.

B.T.C. Theses

Following is the list of those who received the degree of Bachelor of Textile Chemistry, with the titles of their chosen theses, each thesis having to be completed and approved before final award is presented:

Robert Burns, Easthampton. "The Application of Vat Dyestuffs to Wool and Silk."

James Francis Corbett, Dracut, "A Study of Wool, Oils and Emulsions." (Thesis with John F. Fitzgerald.)

William Francis Dolan, Lowell. "A Study of the Dyeing Peculiarities of Reduction Vat Dyes of the Anthraquinone Type."

Paul Leon Fasig, Reading, Pa. "The Concentration and Control of the Rayon Settling Bath."

John Francis Fitzgerald, Lawrence. (Thesis with James F. Corbett.)

Stephen Kenneth Ford, Haverhill. "Some Derivatives of Ortho-Cresotinic-Anilide."

John Vincent Killheffer, North Caldwell, N. J. "The Prevention of Mildew in Cotton Goods."

Benedict Josephus McKay, Stoughton. "A Scientific Study of the Different Sizing Materials on Cotton in Respect to Their Advantages and Disadvantages in the Various Methods of Application."

Harold Hrant Parigian, Hudson. "Possible Substitution of Organic Dyestuffs, for Mineral Oxides, Used for Coloring Cement, Either Used to Color Cement Directly in the Mixing or Coloring It Superficially."

Francis Rudolph Rodalvicz, Anthony, R. I. "A Study of the Isomers of Para Cresotinic Anilide and Certain Derivatives of Them."

Clifford William Sampson, Plymouth. "The Effect of Chlorine Bleaching Solutions on Dyed Cotton in Conjunction with White (or Gray) Cotton."

John Francis Shea, Fitchburg. "The Tendering of Cotton Cloth by the Action of Sodium Hypochlorite."

Elias Aaron Tarshis, Springfield. "The Methods of Analysis and Composition of Commercial Rayon Lubricants."

George Chester Ward, Andover. "A Comparison of the Various Methods of Determining the Reducing Power of Hydrosulphites and Sulphoxylates."

E. Maybelle Warren, Billerica. "Temperature Control of Acid Dyeing with Relation to Critical Temperatures."

THE LEIPZIG FAIR

The great Leipzig Fair, the largest trade exposition in the world, will be held this fall from August 26 to September 1. The Fair will attract buyers from forty-three countries, while a score of countries will send some 10,000 exhibits. America's growing activity in world markets is indicated by her sending upwards of 2,000 buyers and some fifty exhibits to this great world market place

The Fair is held at the height of the American tourist season and may be conveniently included in a European trip. The exposition, which includes every product of modern industrial life, is so arranged that one can see more in a day at Leipzig than in a month's travel to different markets. A visitor is enabled to completely review his own trade and its allied branches, gaining new ideas, and profitable business contacts.

The Leipzig Fair is approaching its 700th anniversary. Originally a picturesque medieval trading center, it has grown with the times into the most cosmopolitan industrial exchange in the world.

SAFETY EDUCATION IN INDUSTRY

Excerpts from a Radio Talk

IN all manufacturing plants to-day there are mechanical safety devices to protect workmen against the hazards of working around machines. In too many plants, however, that is as far as safety work goes and a most important factor in a worthwhile safety program is omitted, namely, safety education.

Harry D. Immel, director of the Bureau of Inspection of the Pennsylvania Department of Labor and Industry, delivered a talk on this subject over radio recently. Some interesting excerpts from it follow:

"Some accidents are not preventable by mechanical safeguards. Nor can any set rules or regulations be made to ward them off. Their avoidance depends on the development of a definite safety sense in the individual. The development of that sense is the big accident prevention problem in industry. The mechanical safeguard fails to accomplish even what reasonably may be expected of it unless the worker is taught how to use it, and why he should use it. Plant safety regulations prevent accidents only when the workers have been taught the necessity for such regulations.

"No method of imparting safety education to workers in industry has been found to be so effective as the individual plant safety committee method. Its variations are infinite, but whatever the variations may be, the same principle is back of each, and that is the guidance of workers individually and collectively to safer methods of performing their daily tasks.

"Not every plant is large enough to warrant employment of a safety manager, or even to permit of the formation of a safety committee. No factory, however, is so small but that some individual in it can be assigned the duty of safety promotion, even if it is a part-time duty.

"In the last analysis, of course, the success or failure of the safety organization depends on the individual worker. It is vital that each worker be made to feel that he or she is a unit in the organization, and that failure of any individual to do his or her part endangers the success of the whole. The safety organizations which accomplish most are those in which this spirit is fostered.

"Our imagination can hardly grasp the extent of the sorrow and suffering which falls upon the afflicted homes of the victims of our annual industrial casualty list. Few of us have prepared for that rainy day. The accident which robs us of the family bread winner or sadly reduces his earnings scarcely never finds us ready to meet the situation. There follows inevitably the sacrifice of those little luxuries which contribute so much to happiness in the homes, while plans for education of children and for accumulation of a reserve for old age perhaps all must be put aside, and mere day to day existence becomes a sufficient concern.

"In a day in which all the efforts of science are being concentrated on elimination of waste and the conservation of our resources, in which man's humanity to man stands forth as a shining light, no service seems more worth while than that of imparting safety education to every man, woman and child."

TO STUDY EFFECTS OF ATMOSPHERE ON TEXTILES

The influence exerted by excessively dry household atmosphere on the color and texture of rugs and other textile materials commonly used in homes will be the subject of study by the Holland Institute of Thermology, according to an announcement from the Holland Furnace Company, of Holland, Mich.

The Institute of Thermology has been established only recently. One of its chief objects is to make homes healthier places to live in and to improve the relative humidity in them so that fabrics, furniture and other goods are not adversely affected. A prominent research engineer will be appointed to direct the investigations and tests, and the results will be placed before the public from time to time in the form of reports of findings. The science of domestic heating and ventilation will constitute the principal field of investigation.

COTTON'S THOUSAND USES IN BULLETIN

How many cotton manufacturers know *all* the uses of their product? A bulletin recently issued by the Department of Commerce is entitled "One Thousand Uses for Cotton" and represents the first published findings of the department's "New Uses for Cotton" investigation. Approximately a thousand different uses to which fabrics containing cotton are put have been listed, with 136 basic fabrics made wholly or partly of cotton.

The Department of Agriculture and the Cotton Textile Institute are co-operating with the Commerce Department in its investigation. The second phase, which is now under way, will have for its objective the discovery of new uses for cotton and cotton products.

Cotton fabrics are used extensively, the bulletin shows, not only as wearing apparel and in the household, but also on the farm and in a great number of manufacturing industries. Duck or canvas is usually associated with tents and sails but the bulletin indicates that it is used in more than 100 different ways. Gingham, ordinarily a dress fabric, has more than thirty uses, as has also cretonne. The continued growth of the automobile industry has brought about a huge demand for fabrics for upholstery, tops, brake linings, etc., while the development of the airplane is creating a demand for cotton fabrics for wings, fuselage covering, parachute cases, etc. According to the bulletin, more than 150 separate articles made of cotton are used on the farm; 100 are listed as used in the household; forty-three by railroads and about twenty for "industrial uses."

NEW EDITION OF COLOR CARD IS ISSUED

Standard Card, Enlarged, Fruit of Long Study

THE most comprehensive collection of staple colors ever assembled are displayed in the new revised eighth edition of the Standard Color Card of America issued last week by the Textile Color Card Association.

The new edition of this standard card, according to Margaret Hayden Rorke, managing director of the association, represents the fruition of thirteen years of broad experience and intensive study of the color requirements of American industry.

As a lexicon of commercial colors the card is invaluable to every user of color in all branches of industry and trade. Every costume designer, every color specialist and every student of industrial art will find the new standard color card of great service.

"Now that color is taking so important a place in our house decoration and in fashion, a color chart such as that issued by our association is really of the greatest value to the consumer, the dealer and the manufacturer," Mrs. Rorke declared in her announcement. "No housewife wants a riot of color—that is, if we are to have an abundance of colored objects, draperies and clothes we want the various tints to harmonize. It is very difficult for even the trained color specialist to carry a subtle gradation of color in his mind. Certainly it is far simpler if he wishes, let us say, burnt orange to have one definite burnt orange on the color card for reference.

Thus, the card is invaluable for textile designers, retail department stores and their educational directors, their merchandise managers, buyers, advertising and display managers—in short, to every student of color in its application to industrial art. The young student of physics pondering over the colors of the spectrum; the chemist interested in the products of various dyes—all may want a standard color card for ready reference. The art student seeking the various gradations of color for his work in oils or water color; the mural decorator, intent on what colors will stand out or recede on walls; the costume of scenic designer, eager for striking theatrical effects, all may have their color sense stimulated by the study of the 192 shades on this new card.

The 192 colors are grouped in distinct color families, arranged in harmonious relationship. Some families contain as many as eight tints and shades of one hue. On this new eighth edition card, 110 shades are repeated from the seventh edition with 82 additional colors. Forty-four colors on the seventh edition have been discarded because they have become commercially obsolete. Some colors have been "modernized."

All blues, or reds, or greens are not placed together in order to avoid discordancy between the different degrees of the quality of each color. As, for instance, bluish reds are separated from yellowish reds; yellow greens are separated from grayish and bluish greens; greenish blues are separated from purple blues, and so on because, if placed together, they would clash. By this division the individual qualities of the color groups stand out more distinctly. Through the arranging of color families in analogous gradation, the value of each shade is emphasized. There are a few colors that singly represent individual types such as Tangerine, Fuchsia or Nile. These are placed in harmonious juxtaposition between color families. As usual, each color is identified by a cable number and name. Thus, as a lexicon of commercial colors, it is invaluable to every user of color in all branches of trade.

In addition to the standard card, the Textile Color Card Association issues season cards each spring and fall. These show standardized colors forecasting the season's color development. Since the founding of the association in 1915 more than 258,000 color cards have been issued for the benefit of American industry.

A. S. T. M. MEETING PROMISES EXCELLENT PROGRAM

Members of all committees of the American Society of Testing Materials will journey to Chalfonte-Haddon Hall, Atlantic City, for the thirty-first annual meeting of the society, to be held during the week of June 25.

A full program of discussions and reports has been announced, and a most comprehensive meeting is expected. Committee D-13 on Textile Materials will make its annual report at the opening of the third session, on Tuesday, June 26. W. F. Edwards is chairman of this section. The remainder of this session will be devoted to reports on rubber, coal and timber. The other sessions of this one week meeting will cover various metals, petroleum products, insulating materials, etc.

A. C. S. CHEMISTRY INSTITUTE LECTURES TO COVER BROAD FIELD

Hundreds of chemists in many branches of industry and science will devote three weeks this summer to the intensive course of educational lectures and conferences given by the Institute of Chemistry of the American Chemical Society. This, the second annual session of the Institute, will be held at Northwestern University, Evanston, Ill., July 23 to August 18.

Twenty-eight conferences covering the major fields of chemistry will comprise the principal part of this year's program, according to the plans recently announced by the Institute. Round-table discussion will provide an interesting means of studying fifty other topics subordinate to the main program.

Prof. F. C. Whitmore, chairman of the Division of Chemistry and Chemical Technology of the National Research Council, has been appointed director of the Institute for one year. During its session at Evanston he will address a conference on Modern Organic Chemistry. Sir James Colquhoun Irvine, principal and vice-chancellor of the University of St. Andrews, Scotland, will be among the prominent foreign scientists who will lecture at this year's session. Dr. G. L. Wendt, dean of chemistry

and physics at Pennsylvania State College, has been named lecturer on "Industrial Research"; Prof. Harry N. Holmes, of the Department of Chemistry of Oberlin College, will lecture on "Colloids"; Prof. W. T. Read, Texas Technologic College, has been appointed to the faculty and will take as his subject "Modern Industrial Chemistry."

DYE AND CHEMICAL MEN ENJOY TWO-DAY OUTING

Fifty executives of the dye and chemical industry carried golf bags and tennis rackets to Bellport, Long Island, on June 7, to participate in the annual outing of the Synthetic Organic Chemical Manufacturers' Association, held at the Wyandotte Inn. The general business meeting scheduled was dispensed with in the interests of sport; the board of governors of the association held a brief conference and then adjourned to the links.

Some phenomenal scores were piled up on Friday, June 8, the second day of the outing. The weather was an important contributing factor. The first prize in the golf tournament was awarded to F. M. Fargo, Jr., of the Calco Chemical Company, who turned in a net score of 70; the second to S. W. Wilder, of the Merrimac Chemical Company; the kicker's prize to E. H. Klipstein of E. C. Klipstein & Sons Company. J. L. Crist, of the Beaver Chemical Corporation, won the tennis prize.

VIGILANCE KEEPS SILK ROBBERIES DOWN

HE must be an unusually brave and resourceful thief who attempts to steal silk from trucks or mills in Pennsylvania, New York and New Jersey. A survey of the police systems in these States with respect to police co-operation with silk dyers and manufacturers revealed a very methodical and efficient system in force.

Not only are the police vigilant in watching over silk trucks on public highways, in furnishing protection to silk storage houses and mills, according to Ramsey Peugnet, secretary of the Silk Association, but when theft does occur they are most energetic in tracking the thieves and retrieving the stolen property. A survey of these protective measures was made by the Missing Properties Bureau and Road Patrol of the Silk Association.

The association is urging that employers instruct their watchmen to report immediately the presence about the mill property of strange persons or motor cars, and upon no condition whatsoever to admit unknown persons into the mills. In certain towns in Pennsylvania a system has already been started, and the plan is being extended to other districts, whereby watchmen at mills call the police headquarters at regular intervals during the night. Failure to call the department results in an immediate investigation by the police.

A well worked out system has been planned by the Road Patrol of the association for the protection of silk trucks while traveling on the public highway. Arrangements are made whereby all silks trucks bearing special identification marks are under the supervision of the highway police, as well as the association Road Patrol. Drivers of all such trucks have been bonded and fingerprinted and instructed in a code of ethics by the Road Patrol. They are given instructions as to what routes to travel. They are told what to do in case of hold up.

As a constant reminder to police officers that trucks carrying silk, a valuable textile commodity, are moving in their vicinity, each police station in silk centers is supplied with posters conveying the information that trucks bearing the association's insignia should travel by the most direct and frequented route, and that, if the police see these trucks in strange places or operating under suspicious circumstances, they should make an immediate investigation.

HARRIS HEADS SOUTHERN TEXTILE ASSOCIATION

Carl R. Harris has been elected president of the Southern Textile Association. He was graduated from the Textile School of North Carolina State College in 1917, and began work in the Lancaster (S. C.) Cotton Mills under the supervision of F. Gordon Cobb. While there he became interested in the work of the Southern Textile Association and was made chairman of the Spinners Section, a position which he has held for several years and in which he has rendered valuable service to the Southern textile industry. For several years Mr. Harris was assistant superintendent of Inman (S. C.) Mills, and resigned that position this spring to become superintendent of the Erwin Mills, Cooleemee, N. C.

Mr. Harris is the fourth alumnus of the Textile School of North Carolina State College who has been president of this association. His predecessors were: Arthur M. Dixon, president of Dixon Mills, Gastonia, N. C., and vice-president of the American Yarn & Processing Company, Mount Holly, N. C.; John W. Clark, president of Randolph Mills, Franklinville, N. C., and L. R. Gilbert, treasurer and manager of Audrey Mills, Weldon, N. C.

A real get-together party was enjoyed by members of the Eastern Connecticut Mills Association at Moosup, Conn., on May 25. More than 150 of the members journeyed to Moosup for a dinner that was followed by some exceptionally fine entertainment. The dinner was served at the Methodist Episcopal Church by the Epworth League, and the entertainment was put on at the nearby Best Theater in Moosup. Leroy Bennet, president of the association, arranged this little party and was ably assisted by Milton Duxbury, also of the Aldrich Brothers Company.

The Philadelphia office of the National Aniline & Chemical Company moved both warehouse and offices on June 11 to 200 Front Street. S. W. Wood is district manager of this branch.

Proceedings of the American Association of Textile Chemists and Colorists

The American Association of Textile Chemists and Colorists

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Newport Chemical Works, Passaic, N. J.

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Lowell Textile Junior Section—
John V. Killheffer, Chairman; Earl W. McLean, Secretary.

Applications for Membership

Active Membership

Boyle, Henry G., assistant overseer, Seekonk Lace Company, Pawtucket, R. I. Sponsors: Charles R. Ewing and Winn W. Chase.

Fleishmann, Meyer, head chemist, Real Silk Hosiery Mills, Indianapolis, Ind. Sponsors: A. T. Brainerd and A. J. Mease.

Feit, Al J., salesman and demonstrator, Newport Chemical Works, Inc., Chicago, Ill. Sponsors: A. J. Mease and R. P. Cole.

Kampf, Harold E., colorist, H. D. Kampf, Inc., New York City, N. Y. Sponsors: W. W. Hales and O. H. Gennsler.

Scoffstall, Chas. W., chief, Textile Section, Bureau of Standards, Washington, D. C. Sponsors: A. S. Eichlin and E. M. Schenke.

Skinkle, John H., instructor, Lowell Textile Institute, Lowell, Mass. Sponsors: L. A. Olney and A. K. Johnson.

Stevens, Raymond R., dyer, Felters Company, Inc., Millbury, Mass. Sponsors: J. B. Manning and F. L. McCool.

Travis, Herbert S., superintendent of dyeing, Sek-Reliance Corporation, Covington, Ky. Sponsors: A. J. Mease and Edward Weber.

Changes of Address

Appel, Wm. D., 3341 Runnymeade Street, Washington, D. C.

Gile, Harold F., 51 Holton Street, Winchester, Mass.

Govier, Geoffrey, E., care of C. W. Buffington, A. T. Walraven Book Cover Company, Dallas, Texas.

Hacking, James H., 179 North Street, North Adams, Mass.

Johnson, Arthur K., care of Cheney Brothers, South Manchester, Conn.

Jury, A. E., care of United States Rubber Company, 1790 Broadway, New York City.

Oesterreigh, Irving E., 1392 Fratney Street, Milwaukee, Wis.

Selya, Hyman P., care of Sagamore Color & Chemical Company, 176 Purchase Street, Boston, Mass.

Steele, E. V., 222 West Washington Square, Philadelphia, Pa.

Walsh, Frederic C., 1704 Locust Street, Norristown, Pa.

Walsh, J. Wm., care of Textile Silk Dye Works, Torresdale Avenue and Church Street, Philadelphia, Pa.

Proceedings of the American Association of Textile Chemists and Colorists

REPORT OF THE SUB-COMMITTEE ON LIGHT FASTNESS[1]

2. The Fading of Dyed Textiles in the Light Transmitted by Various Glasses[2]

Introduction—Spectral Distribution of the Radiation—Spectral Transmission of the Glasses—Experimental Procedure—Experimental Results—Discussion—Summary

By WM. D. APPEL[3] and WM. C. SMITH[4]

Abstract

Twenty selected dyeings were exposed to sunlight without glass cover and under window glass, Corex, Vita, and six other special glasses of known transmission. The fading is recorded in the form of quantitative reflection measurements. The spectral distribution of the radiation and the extent to which the fading of the dyeings is affected by changes in distribution and intensity produced by passage through the glasses are reported.

1. Introduction

ONE result of the earlier experiments of the Sub-Committee on Light Fastness was the recommendation of a particular sunlight exposure test for adoption as the standard.[5] The present work was undertaken particularly to find out whether ordinary window glass is a suitable material for covering the exposure boxes in this standard test, or whether some special glass which transmits more of the ultra-violet radiation, such as Vita or Corex, is required. At the same time it has been possible to study in a more general way the extent to which different parts of the solar spectrum fade dyed textiles.

In brief, the experiments consisted in the exposure to sunlight of identical sets of twenty selected dyeings without glass cover, under Corex, Vita, and window glass, and under other glasses having suitably chosen spectral transmissions. Intercomparison of the samples then showed the effect of the light transmitted by the glasses. The differences in fading were not only judged visually but were recorded quantitatively by spectral reflection measurements. The spectral transmission of the glasses and the approximate spectral distribution of radiation in the standard test are recorded.

2. Spectral Distribution of Radiation in the Standard Test

Daylight exposure tests are subject to large variations in the intensity and spectral distribution of the radiation and in environmental factors such as atmospheric humidity. These variations lead to marked differences in the relative fading in series of dyeings exposed at different times. By limiting the exposure to between 9 a. m. and 3 p. m. on clear days the low intensity radiation and high atmospheric humidity occurring at intervals during continuous exposure is avoided. The results of tests have been shown to be in a general way reproducible at different times of the year and in different parts of the United States. On this basis the following standard conditions of test have been proposed by the sub-committee. "Samples are exposed at an angle of 45° from the horizontal facing south, between 9 a. m. and 3 p. m. on sunny days only, in a cabinet covered with a good grade of window glass approximately one-eighth of an inch thick and open at the sides in such a way as to allow free access of air to the samples. The distance between the samples and the glass should be not less than ½ inch."[5]

It is of special interest in connection with the experiments to be reported here to inquire into the spectral distribution of the radiation in this standard test. The energy distribution in the solar spectrum outside the earth's atmosphere is represented by curve A, Fig. 1. The mean vertical transmission of the atmosphere above Washington, D. C., on cloudless days is shown in curve B. Combining these two curves one obtains curve C, which would represent the relative energy at the earth's surface at Washington if the sun were directly overhead. The proportion of the ultra-violet to the total radiation in the direct solar rays decreases as the distance of the sun from the zenith increases. However, in the standard sunlight exposure test not only sunlight but sky light falls on the samples. The blue color of clear sky at Washington, D. C., has been found by Priest[6] to match that of the

[1] The Sub-Committee on Light Fastness of the Research Committee, American Association of Textile Chemists and Colorists, William H. Cady, Chairman

[2] Publication approved by the Director of the Bureau of Standards, Department of Commerce.

[3] Associate Chemist, Bureau of Standards.

[4] Research Assistant of the American Association of Textile Chemists and Colorists.

[5] American Dyestuff Reporter, **16,** 707 (Nov. 14, 1927), also **14,** 853 (Dec. 28, 1925).

[6] I. G. Priest, J. O. S. A. and R. S. I., **7,** 78 (1923).

theoretical black-body radiator at a temperature of from about 10000° to 24000° absolute. The spectral distribution of 24000° is shown at D (Fig. 1). This curve, showing rapidly increasing relative energy in the violet, represents the distribution of sky light (in the visible spectrum).

On the basis of the measurements referred to above and the best data for the relative amount of direct sunlight and of sky light, Kimball[7] has prepared tables of the spectral distribution of the combined radiation, as well as the sun and sky components at Washington, D. C., for different days and for different altitudes of the sun. These data are not entirely applicable to the exposures to be described because they refer to the radiation received on a horizontal surface. However, Dr. Kimball has very kindly calculated for us from his tables the corresponding values for sunlight falling on a surface placed at an angle of 45° from the horizontal and sloping south for average cloudless days at Washington. A similar computation for sky light cannot readily be made because the sky is much brighter in the direction of the sun than at the horizon. For this reason, the radiation from the sky on the 45° surface has been obtained by arbitrarily reducing by 10% the values given by Dr. Kimball for a horizontal surface. The sum of the sunlight and sky light values thus obtained for the 45° surface gives the curve in Fig. 2. It is significant that in the spectral region 500 to 400 mμ this curve (Fig. 2) is essentially the same as that for sunlight outside of the earth's atmosphere (A, Fig. 1). The light from the sky appears to compensate for most of the loss due to atmospheric diffusion of the direct solar beam. In the absence of data the dashed portion of the curve in Fig. 2 has been drawn following the general shape of the curve for sunlight outside of the atmosphere. This curve may be taken to represent the approximate spectral distribution of energy in the radiation received by the glass cover used in the standard test. Kimball's data for a typical hazy summer day at noon and for a clear winter day at about 9.30 a. m. are also plotted in Fig. 2 to indicate the variations in spectral distribution which may occur during the standard test.

3. The Glasses and Their Spectral Transmission

Since several of the glasses could not be obtained in pieces larger than 6½ inches square, all of the cover glasses used were of this size. Four pieces of each kind

[7] Monthly Weather Review, **52**, 473 (Oct., 1926).

TABLE 1

GLASSES USED FOR THE EXPOSURES

Set	Glass	Manufacturer	Av. thickness in mm	Remarks
A	No glass			
B	Corex	Corning Glass Works	3.5	Transmits visible and ultra-violet freely to beyond the limit of the ultra-violet in sunlight.
C	Vita	Vita Glass Corporation through Hires, Turner Glass Co.	2.5	Intermediate in ultra-violet transmission between B and D.
D	Window Grade A	Hires, Turner Glass Company	3.3	Absorbing the ultra-violet beyond 325 mμ.
E	G385DP	Corning	4.9	Intermediate in ultra-violet transmission between D and F.
F	Noviol O	do.	6.5	Absorbing ultra-violet and transmitting visible radiation.
G	Red G 24 Darker than 100%	do.	6.7	Absorbing ultra-violet and visible except red.
H	Blue G584J	do.	4.9	Absorbing red and transmitting rest of visible and near ultra-violet.
I	Black (Red Purple) G986A	do.	4.6	Absorbing the visible and transmitting ultra-violet.
J	"Actinic"	Penn. Wire Glass Co.	5.6	Included because it is said to reduce glare and heat and to give some protection against fading.

of glass were required. With the exception of the Vita glass and window glass, the pieces were unpolished. Table 1 gives the average thickness and spectral region transmitted by the glasses. Fig. 3 shows the spectral transmission graphically. Measurements were obtained at 254, 280, 313, 334 and 365 mμ in the ultra-violet and at 405, 436 mμ and at close intervals between 460 and 700 mμ in the visible spectrum.[8] All the glasses except H, I and J (Table 1) transmit freely in the infra-red. I transmits very little infra-red.

The transmissions of two pieces of Corex glass and one of Vita glass were measured at wave lengths 254 and 280 mμ when received and after exposure for 123 sun hours. A considerable lowering of the spectral transmission of these glasses was found (see Fig. 3). Although this change would have but little effect on the present experiments it may be of considerable importance, for example, when mercury arc lamps are used as the

[8] Measurements below 460 mμ were furnished by the Radiometry Section of the Bureau of Standards.

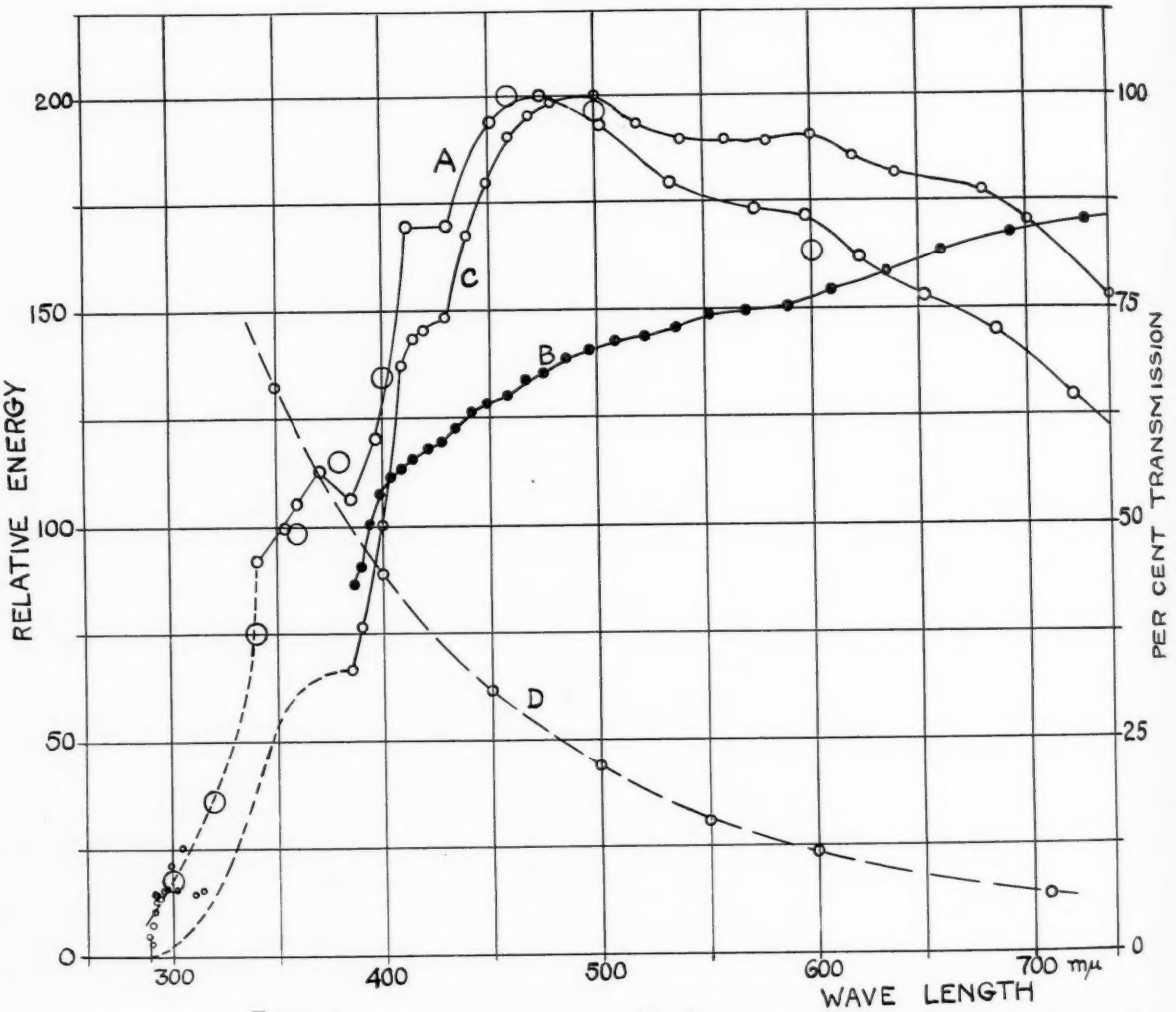

FIGURE 1

(A) Energy distribution in the solar spectrum outside the earth's atmosphere.

○ = Abbot, Fowle and Aldrich. Smithsonian Misc. Col. **74**, 15 (June, 1923).

○ = Fowle. Smithsonian Physical Tables, 7th Revised Ed. (1920).

○ = Fabry and Buisson, Astrophysical Jour. **54**, 297 (Dec., 1921).

(B) Vertical transmission of the atmosphere above Washington, D. C., on cloudless days, mean values. Abbot and Fowle, Annals of the Astrophysical Obs. of the Smithsonian Inst., **2**, 113 (1908).

(C) Energy distribution in the solar spectrum at Washington, D. C., for vertical transmission, obtained from curves A and B.

(D) Energy distribution for 24,000° K., the color temperature of Washington clear winter sky.

light sources in similar tests. Recent (unpublished) work by Coblentz and Stair has shown that the change in Corex glass is superficial. By simply cleaning the surface the original transmission would be restored were it not for the diffusing effect of the surface, which gradually becomes roughened. Thus the total transmission suffers somewhat though the same spectral region is transmitted. Vita glass, on the other hand, undergoes an internal change, which results in a decrease in ultra-violet transmission. However, this change does not go on indefinitely and the transmission of the solarized glass is higher in the ultra-violet than that of window glass. The transmission values found by Coblentz and Stair[9] for completely solarized Vita glass, 2.3 mm thick, are 3 per cent at 280 mμ, 25 per cent at 302 mμ, 45 per cent at 313 mμ, and 87 per cent at 365 mμ.

Window glass is not materially affected by solarization according to Coblentz.[10] The curves given by Coblentz and those given by the British Research Association for the Woolen and Worsted Industries[11] indicate that the window glass used in the present experiments is typical, in its transmission, of ordinary window glass.

In order to illustrate the effect of the various glasses on the radiation transmitted to the samples in the tests, Fig. 4 has been prepared by combining the daylight curve (Fig. 2) with the transmission curves of the glasses (Fig. 3). Fig. 4 then represents the light reaching the samples. It will be seen that because of the rapid decrease

[9] Data from unpublished work on the transmission of glasses.
[10] Letter Circular of the Bureau of Standards, No. 235, third revision, Jan. 14, 1928.
[11] J. Soc. Dyers and Colorists, **43,** 299 (Sept., 1927).

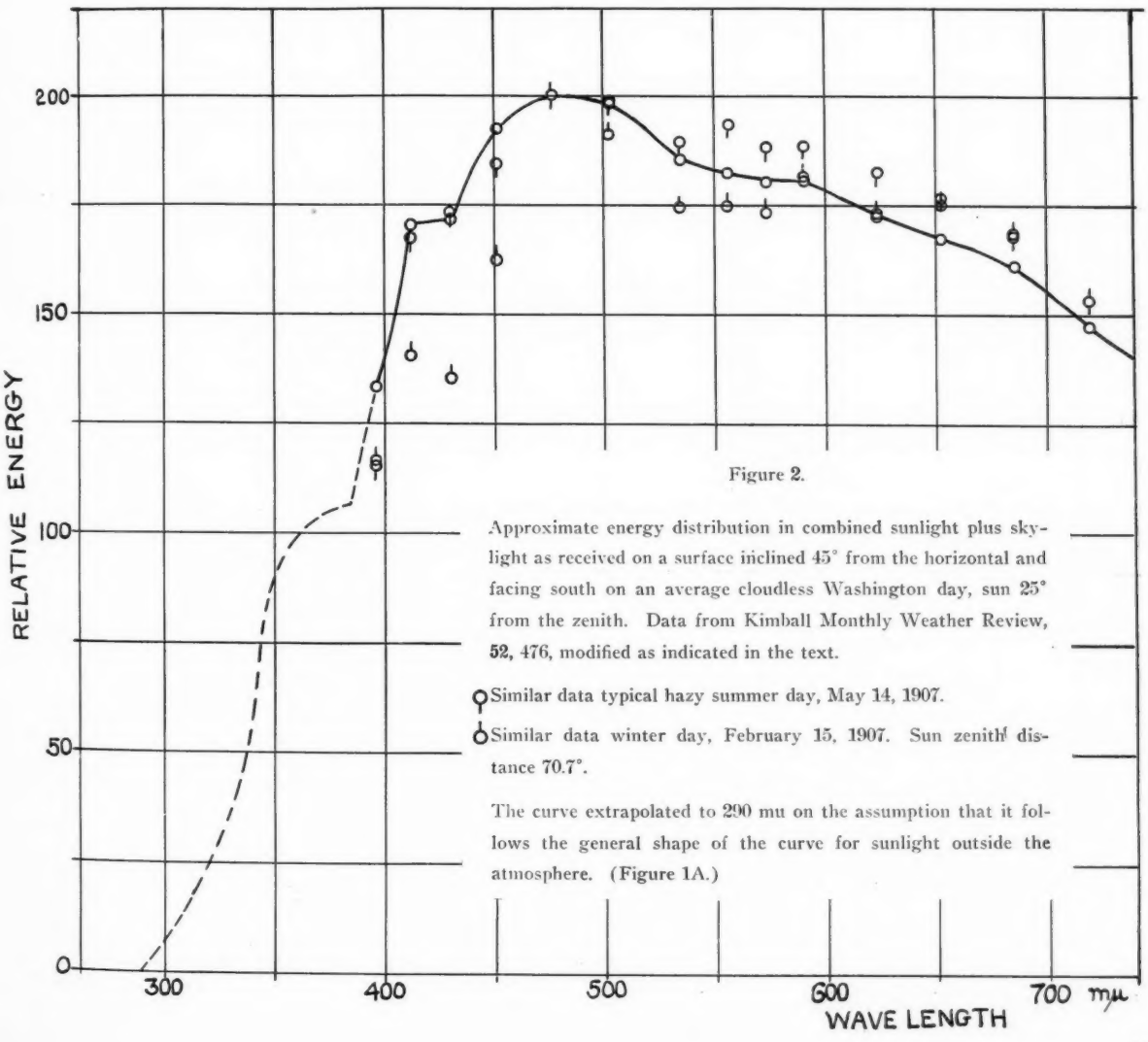

Figure 2.

Approximate energy distribution in combined sunlight plus skylight as received on a surface inclined 45° from the horizontal and facing south on an average cloudless Washington day, sun 25° from the zenith. Data from Kimball Monthly Weather Review, **52,** 476, modified as indicated in the text.

Similar data typical hazy summer day, May 14, 1907.

Similar data winter day, February 15, 1907. Sun zenith distance 70.7°.

The curve extrapolated to 290 mu on the assumption that it follows the general shape of the curve for sunlight outside the atmosphere. (Figure 1A.)

in intensity in the ultra-violet in sunlight the differences in transmission between Corex, Vita, and window glass have relatively small effects on the total light (including ultra-violet radiation) reaching the samples.

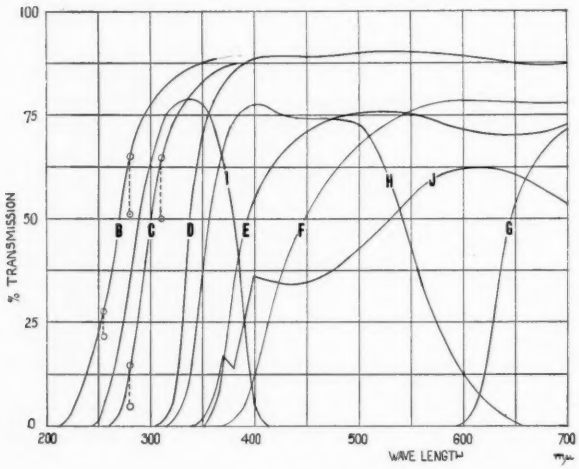

FIGURE 3

Spectral Transmission of Glasses Used in Light Exposure Tests.

(B) Corex Glass (Corning Glass Works).
(C) Vita Glass (Vita Glass Corp., New York).
(D) Window Glass, Grade A (Hires, Turner Gl. Co.).
(E) G 385 DP (Corning)
(F) Noviol O (Corning).
(G) Red Glass (Corning G 24 Darker than 100%).
(H) Blue Glass (Corning G 584 J).
(I) Black Glass, ultra violet transmitting (Corning Corex Glass, Red Purple)
(J) "Actinic" Glass (Pennsylvania Wire Glass Co.).

The transmission of Corex (B) and Vita Glass (C) changed in 123 hours of exposure to sunlight as indicated at wave lengths 254, 280 and 313 mμ.

4. Experimental Procedure

The dyeings are listed in Table 2, in which sample numbers are given in the first column and letters designating the sets across the top. The sets consist of 2¼ x 6 inch portions from each of the same twenty dyeings and are therefore identical. The samples were mounted on black paper cards with wire staples and were then fastened to boards in rows so that the left half of each sample was covered with opaque black cardboard and the right exposed to light. The covering glass was supported at a distance of half an inch above the samples. Outside air had access to the intervening space. The exposures were made on the roof of the Industrial Building, Bureau of Standards, Washington, D. C. They were made at an angle of 45° from the horizontal, facing south, between 9 a. m. and 3 p. m. on clear days between July 20 and October 2, 1927.

Each sample received four different periods of exposure, the duration of which depended on the fastness of the sample. Samples in Group 1 (see Table 2, third column) received exposures of 6, 12, 24 and 48 hours; those in Group 2, 12, 24, 48 and 96 hours; and those in Group 3, 24, 48, 96 and 192 hours. Each exposure covered an area 1¼ inches square adjacent to the unexposed portion of the sample. All exposures were started at the same time.

When the exposures were completed, the samples in the different sets were compared visually with the corresponding Set D exposures. Set D was exposed under window glass and was taken as the standard of comparison because it was the proposed standard sun exposure already mentioned. A classification of the amount of color change in terms of the Set D fading was made, taking into consideration the fading in all four exposure periods.

The samples were rated as having faded "less" than, "slightly less" than, "equal" to, "slightly more" than, or "more" than the corresponding sample in Set D. This is indicated by the "X" in the appropriate column in Table 2. The "slightly more" and "slightly less" categories are significant chiefly in showing the trend of the fading. The "less" and "more" categories consist of samples which show a distinct divergence from the Set D sample. The samples which faded less than the standard were further evaluated, where possible, by equating the fading of

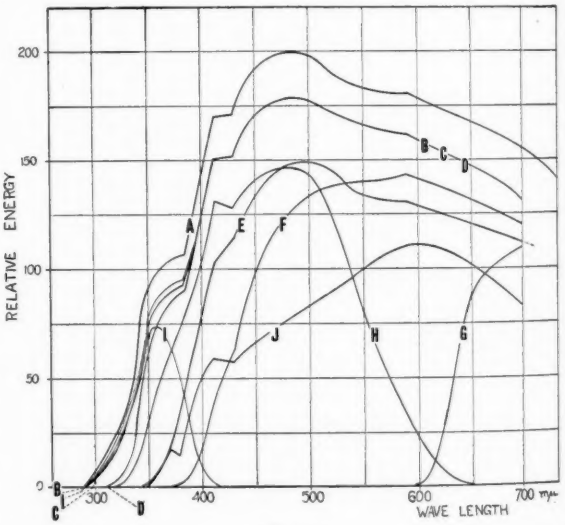

FIG. 4

Energy Distribution in the Radiation Reaching the Samples Exposed Under the Glasses. The Letters Refer to the Glasses Listed Under Fig. 3 and in Table 1.

TABLE 2

Amount of Fading Judged by a Visual Comparison with Set D (Window Glass) Exposure

Sample No.	Dyeing	Exposure Group (a)	Set A No Glass (b) L	Set A No Glass (b) =	Set A No Glass (b) M	Set B Corex L	Set B Corex =	Set B Corex M	Set C Vita L	Set C Vita =	Set C Vita M	Set E G385DP L	Set E G385DP =	Set E G385DP M	Set F Noviol L	Set F Noviol =	Set F Noviol M	Set G Red L	Set G Red =	Set G Red M	Set H Blue L	Set H Blue =	Set H Blue M	Set I Black L	Set I Black =	Set I Black M	Set J Actinic L	Set J Actinic =	Set J Actinic M
1	½% Quinoline Yellow on silk	1	○	X			X			X			X			X			NF			X		X	4			X	
2	2½% Anthra Yellow GC paste on cotton	2		○	X		X			X			X			X			NF			X			X			X	
3	1% Quinoline Yellow O on wool	2	○	X			X			X			X			X			NF			X			4			X	1
4	Naphthol ASG and Fast Scarlet 2G Salt on cotton	3			5	⊗		5			X	X	1		X	2			NF			X			X			X	2
5	2% Phosphine G conc. on silk	1	○	X			X			X			X			X		X	4			X			2			X	
6	¼% Pontachrome Yellow 3R or wool	2						X			X			1	X	2		NF			X	1			X			X	2
7	½% Helindone Orange R pdr. on silk	2	○	X			X			X			X		X	1		NF			X			2			X	3
8	5% Anthra Bordeaux R paste on cotton	3			5	⊗			X			X			X	2		NF			X			X			X	1
9	2% Safranine A conc. on silk	1	○	X			X			X			X			X		NF			X			2			X	
10	2% Erythrosine B on silk	1	○	X			X			X			X			X		NF			X			3			X	
11	1% Victoria Blue B on silk	1	○		X			X			X			1	X		1	X	2		X	1		X	2		X		2
12	1% Victoria Blue BX on cotton	1		⊗			X			X			X		X			X	2			X		X	1		X		1
13	½% Direct Fast Blue SFF on silk	2		5	⊗		5	X		5	X	X	3			NF			NF		X	2		X			X		2
14	Indigo (light navy) on cotton	2		○	X		X			X			X			X		X				X		X			X		
15	1% Alizarine Blue SAP New on wool	2		5	⊗		5	X		5	X	X	2		X	2			NF		X	2		X			X		2
16	½% Methylene Blue 2B on silk	1	○	X			X			X			X			X			X		X	1		X	2		X		
17	¾% Chlorantine Fast Green B on cotton	2		5	⊗		5	X		5	X	X	1		X	2			NF		X	1				X	X		1
18	5% Cross Dye Green 2G conc. on cotton	3		○	X		X			X			X		X	1		X	3		X	1		X	1		X		1
19	6% Hematine on wool	2	○	X			X			X			X		X	1		X	3		X	1		X	2		X		1
20	20% Logwood Crystals (black iron liquor) on silk	3			X			X			X			X	X	3		X	4		X			X	2			X	

(a) Group 1 samples were exposed 6, 12, 24 and 48 hours.
Group 2 samples were exposed 12, 24, 48 and 96 hours.
Group 3 samples were exposed 24, 48, 96 and 192 hours.

NF—No fading.
1—4th exposed quarter equal in fading to 3rd exposed quarter of Set D sample.
2—4th exposed quarter equal in fading to 2nd exposed quarter of Set D sample.
3—4th exposed quarter equal in fading to 1st exposed quarter of Set D sample
4—4th exposed quarter faded less than 1st exposed quarter of Set D sample
5—3rd exposed quarter equal in fading to 4th exposed quarter of Set D sample.

○—Result of similar test of a different dyeing of this same dye in 1926.

(b) L—Less fading
= —Equal fading.
M—More fading.
Checks in other columns indicate intermediate fading, i.e. slightly less or slightly more.

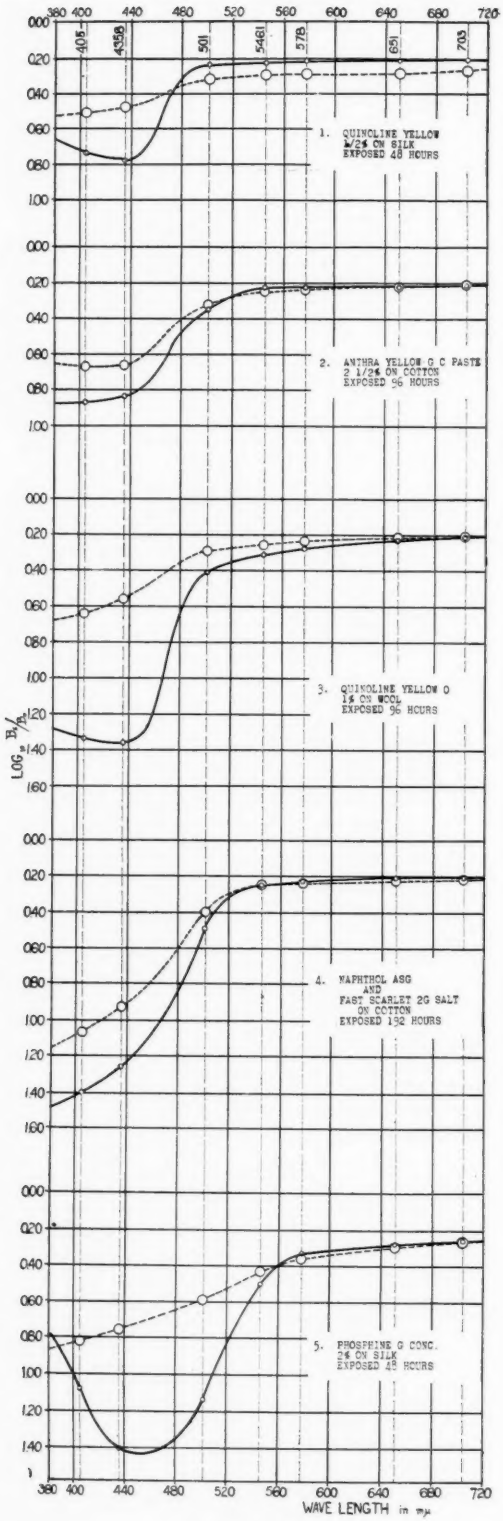
380 400 440 480 520 560 600 640 680 720
405
4358
501
5461
578
691
703
1. QUINOLINE YELLOW 1/2% ON SILK EXPOSED 48 HOURS
2. ANTHRA YELLOW G C PASTE 2 1/2% ON COTTON EXPOSED 96 HOURS
3. QUINOLINE YELLOW O 1% ON WOOL EXPOSED 96 HOURS
4. NAPHTHOL ASG AND FAST SCARLET 2G SALT ON COTTON EXPOSED 192 HOURS
5. PROSPHINE G CONC. 2% ON SILK EXPOSED 12 HOURS
LOG B/A
WAVE LENGTH in mμ

FIGURE 5

the longest exposure with that of one of the shorter exposures of the standard sample. A similar comparison was made of samples that faded more than the standard. For example, Quinoline Yellow on silk, line 1 of Table 2, not only faded less in Set I (column 11) than Set D, but as indicated by the 4 (see footnote to the table) the fourth exposed quarter which, as indicated in column 3, was exposed for 48 hours, faded less than the first exposed quarter (6 hours exposure) of the Set D sample.

The brightnesses relative to magnesium oxide of the unexposed dyeings were measured at seven wave lengths in the spectrum with the Martens photometer and auxiliary apparatus described elsewhere.[12] The samples were observed approximately perpendicularly to their surfaces and were illuminated at an angle of approximately 45°. The most faded areas of the samples in Set D were measured in the same way. The data are given in the form of spectral reflection curves, Figs. 5 to 8. The logarithm of the brightness ratio instead of the brightness ratio is plotted. The solid curve is that of the unexposed dyeing, the dotted curve the longest exposure under window glass. Although these curves can be translated into red, green and blue primary colors or into values of the dominant wave length, purity and brightness, there seems to be no advantage in doing this. Color is three dimensional and cannot be represented by a single variable. The curves are an analysis of the changes in the light reflected from the dyeings and can be understood with a little study by anyone.

The brightnesses of three exposed areas of twelve of the Set D samples were measured at the wave length at which the reflection was found to change most during exposure. These values are plotted as a function of time of exposure in Figs. 9 and 10. The most faded areas of these same dyeings in the other sets were measured at the same wave lengths and the amount of change of each in terms of the corresponding Set D samples is shown by a mark on the curve. Thus, in Fig. 9 the value of the logarithm of the ratio of the brightness of the dyeings of Erythrosine B to that of magnesium oxide at wave length 546 mμ was originally 1.62. It fell off as indicated by the curve to a value of about 0.47 after 48 hours of exposure. After 48 hours of exposure under Corex glass, B, and Vita glass, C, the reflection value at 546 mμ was but slightly lower than 0.47 as indicated by the short vertical line across the curve at BC. After 48 hours of exposure under the black, ultra-violet transmitting glass, I, the reflection value was 1.35, indicating that the sample faded only as much as the window glass exposure faded in about six hours. The curves in Figs. 9 and 10

[12] A brief description of the method and apparatus was given at the annual meeting of the American Association of Textile Chemists and Colorists in New York, Dec. 3, 1927. (See the American Dyestuff Reporter, **17,** p. 49, Jan. 23, 1928.)

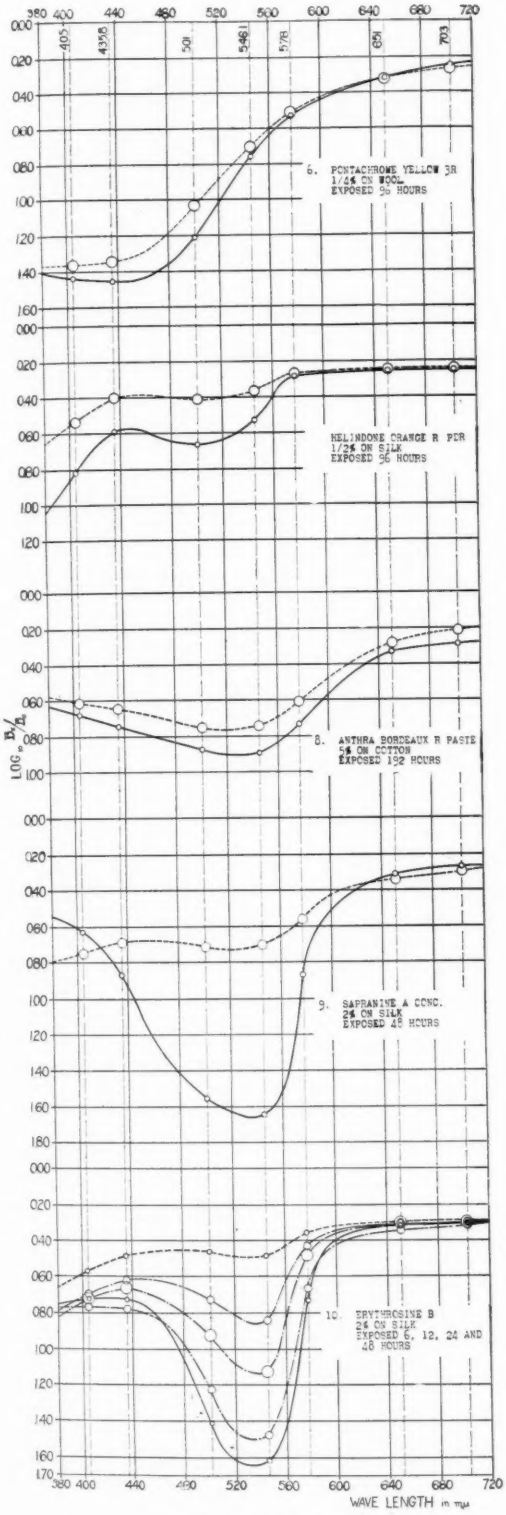

FIGURE 6

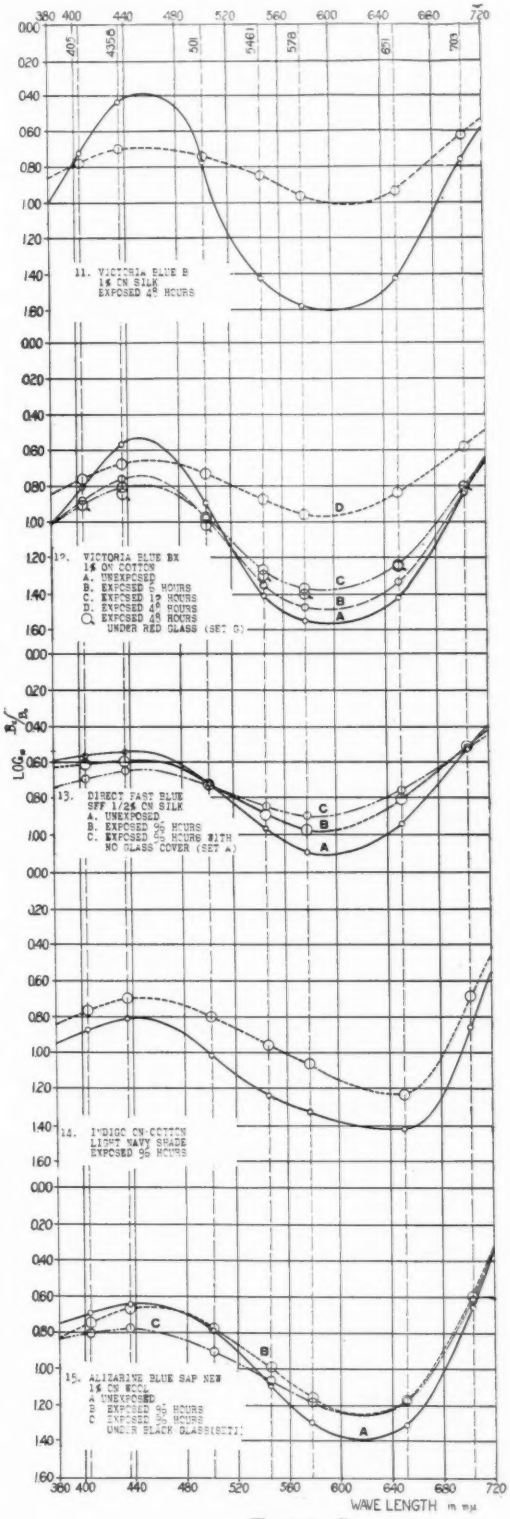

FIGURE 7

FIGURES 5, 6, 7 AND 8

Spectral Reflection of Unexposed (Solid Curve) and Exposed (Dashed Curve) Dyeings. Unless Otherwise Noted, Samples Were Exposed Under Window Glass (Set D).

are related to the fading, i. e., change in color as seen by the eye, and can be taken as a measure of the fading.

5. Experimental Results

It will be seen at once that some of the samples faded considerably more when exposed without glass (Set A) than when under window glass (Set D) and that others faded somewhat less without the glass. This was to be expected because the dyeings were chosen from among those which showed the greatest divergence in behavior when exposed without glass and under glass in previous experiments in which some 1200 dyeings were tested.[13] It is apparent that there was a tendency for those dyeings which faded "more" without glass to fade "more" under Corex glass (Set B) and under Vita glass (Set C) than under window glass (Set D). However, fourteen samples faded to the same extent under Vita glass and under window glass and only four faded decidedly more under Vita glass. Thus the additional ultra-violet radiation transmitted by Vita glass had no appreciable effect on the majority of the samples. It was a large factor in the fading of four of them. The wide variability in intensity of this short wave ultra-violet[14] might introduce serious variations into the results of tests under Vita glass. Window glass, which absorbs this part of the spectrum, would reduce this possibility.

A study of Sets E and F shows that some dyeings faded much less when some (Set E) or all (Set F) of the ultra-violet in daylight which passes through window glass is prevented from reaching the samples. Other samples, however, faded practically as much under the Noviol O glass (Set F) which absorbs the ultra-violet as under window glass. These samples must be faded principally by visible radiant energy.

The red end of the visible spectrum (and infra-red) is shown to have practically no fading action on more than half of the samples for the exposures given and relatively little on the others (Set G) with the exception of No. 14, Indigo on cotton, which is anomalous in its fading as will be shown. Direct Fast Blue SFF No. 13 and Alizarine Blue SAP No. 15 faded but little under the red glass, although they absorb red light. Methylene Blue 2B No. 16 and Victoria Blue BX No. 12 which also absorb red light faded more, 48 hours under the red glass producing about the same effect as twelve hours under window glass. (See Figs. 7 and 8.)

Although the samples exposed under blue glass (Set H) received more ultra-violet radiation than the Set E

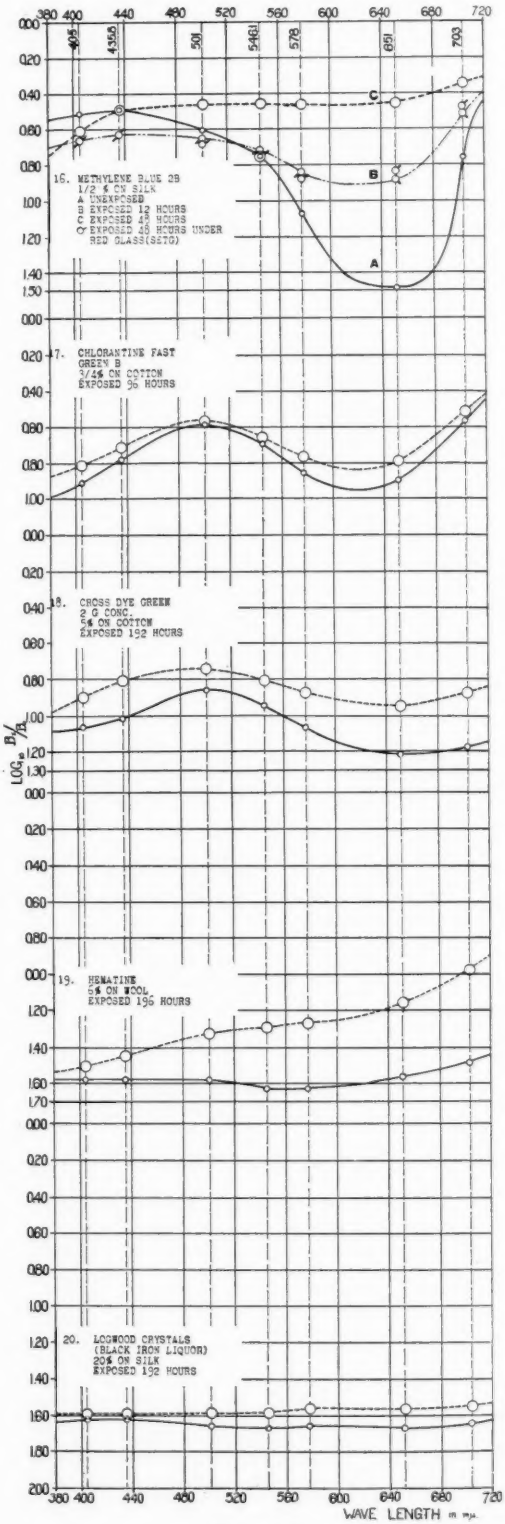

Figure 8

[13] Not yet fully reported. See American Dyestuff Reporter, **15,** 857 (Dec. 27, 1926).

[14] Dodson, Proc. Royal Soc., **104,** 252, 1923, found an average day to day variation of 30 per cent at wave lengths 315 to 320 mμ and variations up to 430 per cent are recorded in his data. According to Dodson, these variations are independent of haziness

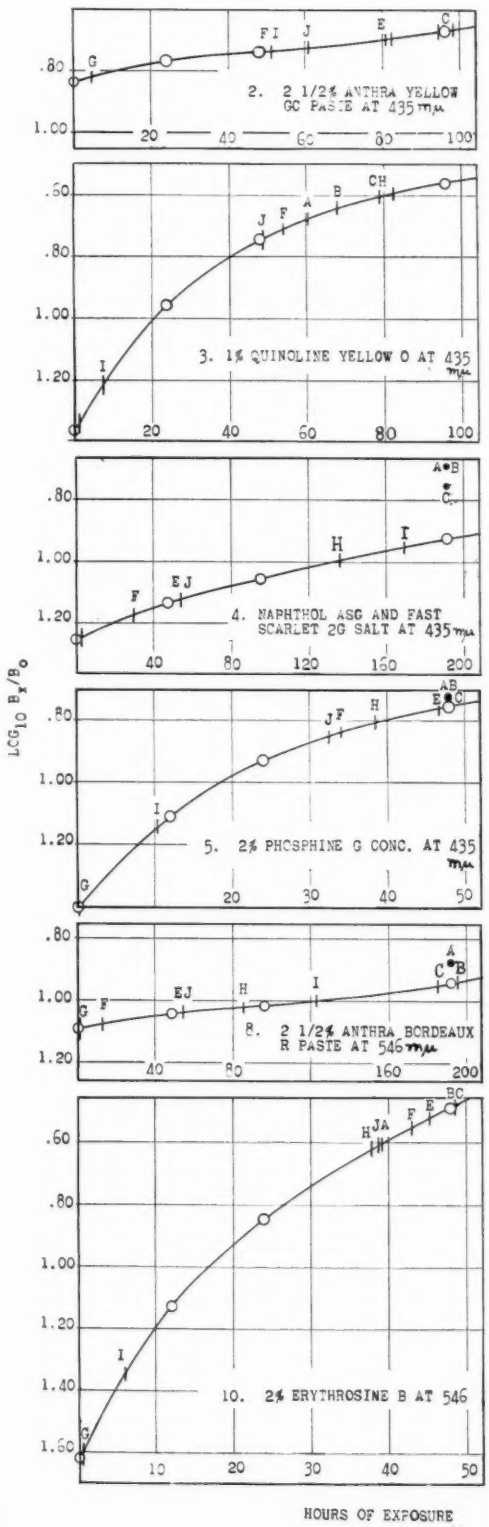
2. 2 1/2% ANTHRA YELLOW GC PASTE AT 435 mμ
3. 1% QUINOLINE YELLOW O AT 435 mμ
4. NAPHTHOL ASG AND FAST SCARLET 2G SALT AT 435 mμ
5. 2% PHOSPHINE G CONC. AT 435 mμ
8. 2 1/2% ANTHRA BORDEAUX R PASTE AT 546 mμ
10. 2% ERYTHROSINE B AT 546
LOG10 Ex/Eo
HOURS OF EXPOSURE

FIGURE 9

Fading curves. The curves represent the change in reflection at one wave length with time of exposure in hours for samples exposed under window glass (Set D). The extent of the fading of identical samples exposed simultaneously under other glasses (see Table 1) is indicated by the short vertical lines across the curve. The time of exposure under these glasses was in all cases that of the longest exposure under window glass, represented by the circle near the right-hand end of the curve.

exposures, several of the dyeings faded less in Set H than in Set E. This suggests that the fading power of wave lengths longer than 500 mμ is appreciable.

The ultra-violet region of the spectrum transmitted to the dyeings in Set I faded several of them nearly as much as the radiation transmitted by window glass. Other dyeings, however, faded very much less in Set I. Sample I-15 faded in a different way from the corresponding samples in the other sets. It faded redder and duller in color than the others. This is shown graphically in Fig. 7.

In general the fading was less under the "actinic" glass (Set J) than under window glass, but the degree of protection against fading afforded by this glass varied with the dyeing from practically none at all to possibly a fourfold or eightfold increase in the time required to fade to a given extent.

It should be observed that the glasses have changed the intensity of the radiation received by the samples, as well as its spectral distribution. Differences in fading cannot be attributed to either factor alone. Thus the dyeings exposed under the red glass (Set G) and the black glass (Set I) might have faded much more than they did if the intensity of the radiation had been greater. However, the relative intensities of the radiation transmitted by the several glasses are not greatly different from the relative intensities of the same spectral regions in the unfiltered daylight. These intensities are more suitable for present purposes than equal intensities would have been.

Several instances of a decrease in reflection, that is darkening, over part of the spectrum are shown in Figs. 7 and 8. Previous work has shown that this behavior is typical of the basic dye types and is most marked in strong dyeings. It is no doubt evidence that the first effect of the light is to convert the dye into another strongly absorbing substance which is subsequently converted to light colored or colorless materials.

The anomalous behavior of Indigo on cotton, sample No. 14, is quite evident in these tests. It faded to nearly the same extent under all of the glasses even though the quality and quantity of the radiation received were obviously different. This is in accordance with the experience of other investigators. Gordon[15] observed that Indigo faded more from some constituent of the atmosphere in contact with his samples than from strong radiation. Cady has obtained similar results (unpublished). Earlier investigators were not aware of this behavior of Indigo and proposed its use as a standard of fastness. It is obvious that the atmosphere about the samples rather than the quality of the light played a dominant part in the fading of Indigo on cotton.

How far this atmospheric effect modified the photochemical fading of the other dyeings in the series is not known. Dyeings similar to all except No. 20 were exposed in 1926 simultaneously under glass and without glass, the type of exposure being that used in the present experiments. Under Set A in Table 1 are indicated the results obtained in 1926. Those dyeings which faded "less" without glass than under window glass in 1926 show the same tendency in the present tests, though not in every case and not to the same degree.

It may appear strange that certain dyeings should fade less without glass than under glass, since they receive more light without the glass. It is well known, however, that a photochemical reaction which is produced by one part of the spectrum may be counteracted by another part of the spectrum.[16] This need not be the only explanation. Differences in the temperature or composition of the atmosphere may also be factors.

The reflection of the dyeings in the ultra-violet is not known and the position of absorption bands in this part of the spectrum can only be conjectured. That absorption in the visible does not necessarily result in fading is indicated by the fact that sample No. 13, for example, with an absorption band in this region, did not fade to any extent from visible radiation. Thus color (or visible absorption) is not a safe guide to the spectral region which causes fading.

Discussion

The results obtained with reference to the effectiveness of different spectral regions in sunlight in fading dyed textiles have been discussed as far as appears necessary in enumerating them. It should be observed, however, that they do not support the prevalent belief in the all-importance of the ultra-violet region of the spectrum, particularly that which is absorbed by window glass. It is found that an increase in ultra-violet radiation does not necessarily result in increased fading.[17] The importance of the ultra-violet radiation which passes through window glass, as well as of the blue and violet regions of the visible spectrum is, however, clearly demonstrated and it is true that some dyeings are particularly sensitive to that part of the solar radiation which is absorbed by window glass. The deficiency of solar radiation in this last-mentioned spectral region, well shown in the curves, should be borne in mind. Not only is it relatively small in amount, but it is extremely variable and at times entirely lacking. The effectiveness of this region for fading should not be exaggerated and should not be confused with its bactericidal and therapeutic importance.

Because of its surface deterioration Corex glass is not

[15] American Dyestuff Reporter, **14,** 502 (July 27, 1925).

[16] S. E. Sheppard, Antagonism of Radiations in Photochemical and Photographic Reactions. Chem. Reviews, **IV,** 319 (Dec. 1, 1927)

[17] This is contrary to the conclusions of the British Research Association for the Woolen and Worsted Industries. J. Soc. Dyers and Colorists, **43,** 297 (Sept., 1927).

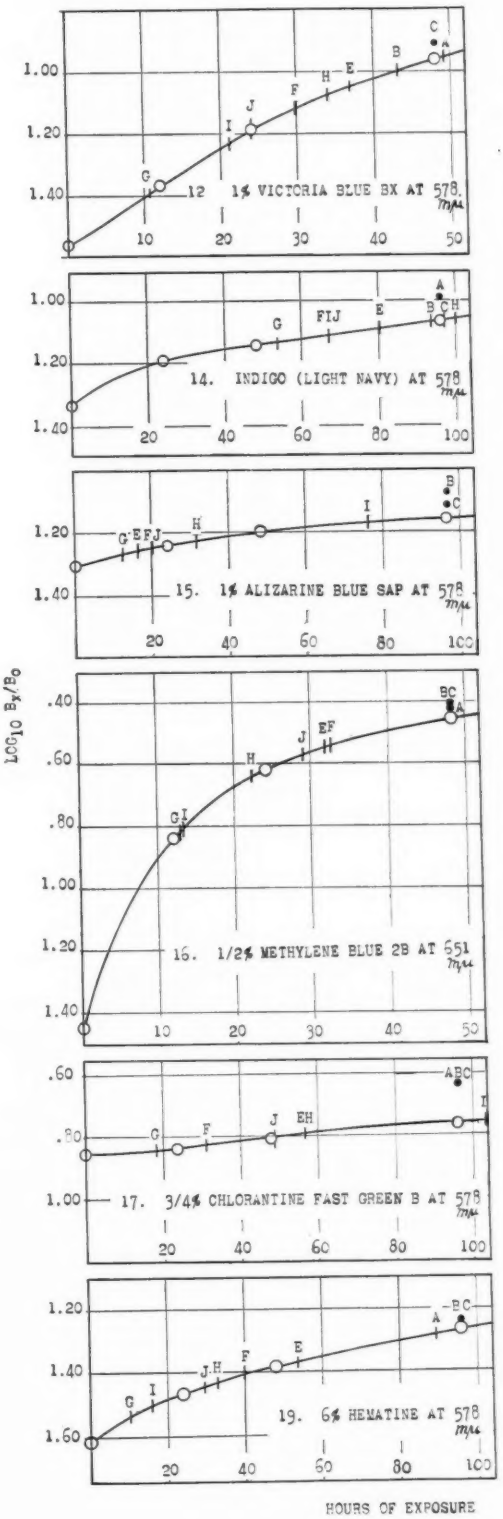

FIGURE 10

Fading curves. The curves represent the change in reflection at one wave length with time of exposure in hours for samples exposed under window glass (Set D). The extent of the fading of identical samples exposed simultaneously under other glasses (see Table 1) is indicated by the short vertical lines across the curve. The time of exposure under these glasses was in all cases that of the longest exposure under window glass, represented by the circle near the right-hand end of the curve.

a particularly suitable material for covering light exposure cabinets. Vita glass changes in transmission when exposed to sunlight and should be exposed to quartz-mercury lamp radiation for a few hours or to sunlight for a few weeks before use. The transmission of window glass is not affected by exposure of the glass to sunlight, but is lower than that of Vita glass for ultra-violet radiation. Window glass is, in fact, opaque to that narrow ultra-violet region of the solar spectrum beyond 310 mμ.

It is questionable whether the better agreement in fading between Vita-glass exposures and no-glass exposures would justify the use of Vita glass when many textiles, such as draperies, are used almost exclusively behind ordinary glazed windows. The use of a window glass cover would tend to standardize the test by eliminating ultra-violet radiation below 310 mμ which is extremely variable in intensity.

The most important consideration in selecting the standard sunlight exposure test was the ability to duplicate relative fading in a series of dyeings at different times. Some sort of a cover was deemed necessary to protect the dyeings from dust and from rain which may come up quite unexpectedly. On the basis of the foregoing work and discussion, a good grade of ordinary window glass is considered suitable for the purpose.

Summary

In conclusion, a summary of the results of this work may be given:

1. The approximate spectral distribution of the radiation in the standard sunlight exposure test of the American Association of Textile Chemists and Colorists is given.

2. The fading of twenty textile dyeings each exposed without glass cover and under nine glasses having different spectral transmissions is recorded in the form of quantitative spectral reflection curves.

3. The effect on the fading of the dyeings of changes in spectral distribution and intensity of daylight produced by passage through the glasses is reported.

4. It is found that the visible and the long wave length ultra-violet radiation in sunlight is relatively more important, in comparison with the short wave length ultra-violet, than is commonly supposed.

5. Window glass is considered satisfactory for covering the samples in the standard sunlight exposure test.

ASSOCIATION BADGES

The lapel button badge illustrated herewith is worn by members of the American Association of Textile Chemists and Colorists.

The three "rings" are enameled in red, yellow and blue, respectively, and the initials and border are brought out in gold. The general effect is exceedingly attractive.

Badges may be secured at $1.50 each by addressing the Secretary.

WALTER E. HADLEY,
5 Mountain Avenue,
Maplewood, N. J.

AMERICAN DYESTUFF REPORTER

Devoted to the use and application of dyestuffs and the mechanical equipment incidental thereto.

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THE REPUBLICAN NOMINATION

FOR more than a hundred years this republic chose its presidents from among men who had distinguished themselves on the field of battle or on the bench. No less than twenty of our thirty presidents were lawyers. But styles in presidents were bound to change with the changing spirit of the country. No longer are the people of the United States a race of pioneers establishing civil law and order in a rough, uncharted land, repelling aggression from without and rebellion from within by force of arms. The highest peak of American civilization is marked to-day by the highest achievements of its commerce and industry. And in the background, responsible to a great degree for the growth and dominance and efficiency of our industry, stand the educational forces, our scientists and engineers.

Can we not justly say that in the choice of a candidate for their next leader a large part of the American people have instinctively recognized the spirit of this new order, and the ever-increasing power which that order is destined to wield in world politics and world progress? Herbert Hoover, born of the early pioneer stock, but following in his career, through youth and manhood, the rapid changes of his country, has distinguished himself as a product of the new industrial era. As he himself wisely observed in his message to the Kansas City convention, "My whole life has taught me what America means."

Throughout his broad and adventurous career Hoover has been intimately identified with this nation's development as one of the major powers. Threads of his personality are woven into the very fabric of our modern industrial system; the term "Hooverized" has come to be applied as aptly to industrial efficiency as it was applied in war time to food conservation. Under his direction the Department of Commerce has become a national agency for the development of our trade and industrial resources, an indispensable clearing house of the most highly perfected methods of carrying on large scale manufacturing and trading operations.

In fact, one can name few other men who understand the science of modern business so thoroughly as Herbert Hoover. And yet he is more than an able American business executive. His mind has been trained to grasp world problems. His experience as an engineer in the Far East, as food administrator in his own land, as head of the European food relief work, has brought within his grasp a knowledge of peoples, of national conditions and international problems seldom gained by one individual in a single lifetime. At a period in its history when the United States has scarcely emerged from the first realization of its new place in the world's society of states, it would seem providential that an influential part of its citizens had seen fit to place the candidacy of its highest office within reach of such a man. His nomination should make even the pessimistic element in business and industry laugh at itself for shying at the old bugaboo of "presidential year."

PROPHETS OF RESEARCH

> There is not a property in nature but a mind is born to seek and find it. For it is not the plants or the animals, innumerable as they are, nor the whole magazine of material nature, that can give the sum of power, but the infinite applicability of these things in the hands of thinking man, every new application being equivalent to a new material. And what is a weed? A plant whose virtues have not yet been discovered.

THIS brief but brilliant definition of applied research might have been broadcast to industry by an enterprising association of technical men seeking financial aid for their laboratory studies on some industrial product or process, such as dyes or textiles; or such a group might have used these very words in explaining to uninformed manufacturers the aims and practical end of research. "Every new application is a new material." The quotation, however, is from one of Ralph Waldo Emerson's essays.

Like many similar sparks from his ranging mind, it serves but to affirm what has been so often said of Emerson: that this country has produced no greater prophet. Particularly have the achievements of modern chemical science borne out his prophecies of threescore years ago.

But the lesson is not yet learned. Threescore years from to-day, or sooner, thoughtful men in American industry will recall to mind the warnings voiced by the prophets of this present age on the need for fundamental scientific research in every branch of industry. To paraphrase the well-known Gospel maxim: A prophet is not without esteem—except in his own age.

NOTHING NEGLECTED

THE chemists of each nation quite naturally believe that the science of chemistry is just a little farther advanced in their own country than elsewhere. But as the study of chemistry broadens the mind and teaches tolerance and catholicity of view, those in the profession will generally be found to hold a very proper and sincere respect for the accomplishments of their foreign colleagues.

We feel sure many American chemists are fully aware of the high standard of progress in the science of chemistry maintained in Japan. The patience and industry of the best Japanese chemists are not less amazing than the almost limitless *range* of their researches. The following paragraph, opening the proceedings of the annual meeting of the Society of Chemical Industry in Japan, is taken from the society's journal and serves to clarify our thought:

> The thirty-first annual general meeting of the society was held on April 2, 3 and 4 in 1928 in the Hall of the Electric Club Building and the Tokyo Imperial University. After the official report was reported, eighty-two papers including almost all branches of the chemical industry were read, and five lectures on the industry of paint, dyeing, cement, electrolytic caustic soda and petroleum in Japan were delivered by the respective authorities. Then three lectures on chemistry in relation to clothes, foods and houses were delivered to the general public. . . .

PATERSON DYE FIRMS UNITE

A combination of four important dyeing and finishing firms of Paterson, N. J., has been effected. The consolidation, known as the Associated Dyeing and Printing Company, comprises as its principals the Royal Piece Dye Works, Inc., the Colt Dye Works, Inc., the Uhlig Piece Dye Works and Cramer & King Company. The president of the Royal Piece Dye Works, W. L. Wirbelauer, has been appointed to head the combination.

Under the new arrangement there will be no consolidation of plants, but each company will specialize as before on certain kinds of work. In this way, it is expected, substantial economies will be effected and the technical experts of each company will be able to cooperate more efficiently.

A public offering of $2,750,000 worth of notes of the new company has been made. The proceeds from this financing will be used to acquire the assets of the predecessor companies and to provide capital for the expansion which it is felt will soon be necessary.

A textile testing laboratory has been opened by the American Pemberg Corporation and the American Glanzstoff Corporation. This is located on the eighteenth floor of the building at 180 Madison Avenue, now occupied by the offices of these two companies, and is in charge of Theodore Burkhardt.

EXTRACTORIALS

Scientific management is not a system. It is not a set of multi-colored forms. It is not a plan of organization. It is not a complicated method of running a factory. . . . We will say that it is the common sense and economical application of all available knowledge and skill in every part of operation, however great or however minute. That is, taking the guesswork out of business as much as is humanly possible.—*J. F. Whiteford, addressing the British Textile Institute.*

To-day we are in the throes of what may be called the "chemical revolution," which will, perhaps, be as widesweeping in its effects as the steam revolution that began a century ago. The stuff of which the universe is composed is being torn apart, molecule by molecule, atom by atom, and out of the atomic fragments new kinds of matter are being created and the release of a new kind of energy is promised.—*Waldemr Kaempffert, in the New York Times.*

One of our greatest problems is to bring to the aid of governmental bodies the technical advice and knowledge of our professional groups. This will be no easy matter, for obviously legislative bodies must be free to work out their own solutions. But, nevertheless, it would appear logical that if all the professional groups had some means of expressing themselves nationally they could be of great service.—*Dexter S. Kimball, Dean of the College of Engineering, Cornell University.*

Perhaps the most useful assistance that the industry can render in applying science to textile manufacture is in the direction of discussing the results of research with its originators. Those who represent the industry and who are capable of taking part in such discussion are, of course, much to blame for not using as they should the opportunity offered by lectures; but what shall I say of the research worker who is offered a platform to speak from and who either refuses it or uses it merely as a means of recitation, failing to organize and conduct the discussion which ought always to bring the richest reward to both the lecturer and his audience?—*Dr. J. H. Lester, addressing the Textile Institute.*

Industry to-day means work. Progress is usually accompanied by change. Practising industry makes great industries and builds them still greater. To hold back industry is to strangle it. To just "get by" is to lose leadership. You are leaders to-day in the development of the technical frame of your industry, but in your continued progress you must also produce men—new technically trained men for the future—if you are to continue to

forge ahead and advance in methods and processes, and this you are doing. You must practise industry early and late to hold your present status, a status which frankly excites our admiration, and I know as well of various groups throughout the textile world.—*W. G. Conover, President of Laundryowners' National Association, Addressing the National Association of Dyers and Cleaners.*

The tendency in this country to put good publicists over good research men in salary and power is one that must be combated for the good of American science. Publicity has come to be a necessity among scientific men in all countries. It is necessary to obtain financial support for research institutions, universities and various scientific societies, and this financial support must come in a large measure from individuals who are not themselves scientists. To this end it is necessary to awaken in the public mind a proper appreciation of the things being done by scientists. However, before research can reach the high plane that it should attain scientists must learn to distinguish between good publicists and good research workers. The chemistry departments in this country that are doing the best research of permanent value are the ones that let their scientific work stand on its own merits.—*Chemical Bulletin.*

LABOR COMMISSIONER FINDS ACCIDENTS INCREASING IN INDUSTRY

While a few thousand manufacturers are doing an enormous amount of safety work, more than 90 per cent of American employers are doing practically nothing to prevent accidents, which are having a rather startling progressive increase, avers Ethelbert Stewart, United States Commissioner of Labor Statistics, in a statement made public by the National Safety Council. Too many employers have settled down to a snug reliance on the operation of workmen's compensation laws, which aren't solving the safety problem, declares Commissioner Stewart.

The question that hasn't been solved is what shall be done in cases of extra-hazardous industries and small establishments, which the insurance companies refuse to insure and which are not able to qualify as self-insurers and which are too widely scattered and too unorganized to form mutual insurance organizations. Thus, although it is the general belief that workmen are protected, as a matter of fact, injured employees in some States are thrown upon public charity, just as they were before the enactment of the compensation laws, despite the fact that the cost of the insurance, which society is supposed to have, has been charged into the price of the commodities produced, and is being paid by the consuming public, states Mr. Stewart. This is more or less true in all States not having some sort of State fund. A large number of States report that the situation as regards workmen's compensation insurance for small plants is steadily growing worse.

It is too early in the development of these menacing conditions to discuss dogmatically any scheme for their solution, but these clouds on the horizon, which at first blush may seem to be no bigger than a man's hand, are in fact shaping themselves into very definite outlines and it is important that the business interests of the nation should see the outline of the conflict and should begin to think about wise methods of solution, believes the commissioner.

RECENT LITERATURE

40 Jahre Kattundruck. A monograph on the production and calculations of textile printing. By Dr. Heinrich Zublin. 81 pages. Price 8 marks. Berchtold & Gommeringer, Lingen-Hohentwiel, Baden.

In a little book of eighty pages the author, in the light of his forty years' experience in a number of print works in Austria, France, Germany and Italy, gives full details about the layout of work in an establishment for calico printing and the proper calculation to arrive at the exact costs. Being based on continental pre-war wages these costs, of course, are quite a little lower than costs in this country and the book, therefore, is more of historical than practical interest.

This also refers to the description of the preparation of the printing pastes and the recording of the formulae.

Year Book, American Engineering Standards Committee —1928. 87 pages.

The standardizing of materials and processes is generally regarded only from the view of a means to greater efficiency in manufacturing. Seldom do we think of the standardization movement as acting to promote a wholesome spirit of co-operation in industry. This is one angle commented upon by James A. Farrell, president of the United States Steel Corporation, and chairman of the A. E. S. C. Advisory Committee. Says Mr. Farrell in the foreword of this committee's year book:

> The three hundred national organizations and the two thousand individuals engaged in the committee's activities prove that widely divergent interests can meet on a common ground. These results constitute one of the most notable examples we have of self-government in industry.

The Year Book outlines briefly the progress in establishing standards in numerous branches of industry.

Forty-nine new standards and forty new projects are listed as having marked the line of advance in this movement during the past year. There are interesting sections in the book on types of standardization, stages of development and the agencies involved; on the method of work pursued by the A. E. S. C., its relation to industrial associations and its co-operation with Government bureaus and foreign standardizing bodies. While the majority of projects and standards listed relate to the mechanical engineering fields, the book is not without interest to chemists and textile men. Only three projects of interest to the textile field are listed, but these are not connected with the processing branches of the industry.

The Dyer's School of Experience

[EDITOR'S NOTE.—*The following narrative is one of a series being published under the general head of "The Dyer's School of Experience." Realizing that the genuine material for such a series is to be found largely among its own readers, The* REPORTER *solicits contributions from that source and will pay for those accepted at regular space rates. Among the readers of this journal there should be many who have, in the course of their experience as dyers or chemists, encountered incidents which should prove most interesting and helpful to their fellows. Send all manuscripts to* AMERICAN DYESTUFF REPORTER. *90 William Street, New York City.*]

GETTING EXPERIENCE

By One Who Did

Episode III

DURING the last job I had been approached several times by a man who was struggling to get a small piece dyehouse on its feet. In Paterson, piece dye, of course, always means silk. They were ambitious to run pure dye, washables, tin-weighted and Baronet satins, and operate an annex devoted to printing. The first overtures did not appeal to me, and in the meantime they engaged a French dyer, so that when I finally accepted a job I found that my entire responsibility was to get the tin-weighting of silk pieces on a substantial basis.

The prospect was good, for my employer painted the future possibilities in glowing colors. What wholehearted support I was to have from the organization! What a bonus I would get from future production! It really looked like a good chance. All the members of the firm were outstanding men in their local churches, and on Sundays fairly radiated good-will and benevolence, and, of course, must have been thoroughly familiar with the principle of doing to others as they would have others do to them. Can anyone blame me for jumping at this chance?

The job started in mid-winter, and my first task was to go over the section allotted to me and have the frozen water pipes and valves put in working condition. From first to last the job called for hip boots and a heavy reefer; but so far as the work was concerned this was an advantage, as many plants install refrigerating apparatus to keep the liquors cool.

The equipment was crude and primitive, which had no effect on the quality of the work but merely slowed up production and increased the labor costs. This condition is true throughout the whole textile industry; the manufacturers who make the greatest profits are those who pay the most attention to the latest developments in mechanical equipment.

THE BOIL-OFF AND WASHING EQUIPMENT

The operation was carried out in the main as follows: The silk pieces (mostly georgettes and a little flat crepe) were folded and hung by strings on sticks in the boil-off bath. The boil-off here consisted of green soap reinforced with a little soda ash. The bath was kept near a boil and the pieces moved several times during an hour. They were washed in warm water first, then in cold, and delivered to the weighting department. The first step was to open up and bundle the pieces so they could be run through the washing machines.

A washing machine consists of several boxes in line with overhead reels about 4 feet from the box. Two, three or four ropes of goods travel parallel, according to the type of machine used.

As the goods leave the water in the box and travel upward, they pass through a flexible rubber pipe about 2 feet long, at the top of which is a ring, connected to the water supply, which sprays jets of water on the goods as they rise to go over the reel to the next box. This arrangement insures thorough washing, and the same type of machine, with unimportant modifications, is used throughout the process wherever washing is necessary

The goods from the boil-off are not completely clean, so they are run through the washer to complete the cleaning. The first box is warmed and contains some ammonia, the next box simply warm water. Warm water also comes from the sprays. The last two boxes are cold, but contain hydrochloric acid. In some plants the acid slowly trickels in to replace that removed by the silk. This souring or acidulation seems necessary, not only to decompose the last traces of lime soap that might be on the goods but because it has been found that the silk takes up a little more tin in the first pass.

When the pieces come off the washer they are either bundled or received in bags. They are hydro-extracted or whizzed, and are ready for their first pass in the tin.

Tin is purchased as stannic chloride or tetrachloride of tin, and must not be confused with stannous chloride, dichloride or tin crystals. It is a heavy, fuming liquid which must be treated with care and consideration. The mixing tank is a large rectangular box lined with rubber

and surrounded by a water jacket. The best equipped plants keep it cool by a manifold of brine pipes connected to the automatically controlled refrigerating machine. A mechanical stirrer and good exhaust ventilation are more of a necessity than a luxury—we had neither. By means of a rubber and glass siphon the strong tin chloride is run below the surface of water in the tank. The chemical reaction of hydration causes a rise in temperature, which must be controlled so as not to exceed 120° F. In cold weather, if the agitation is not energetic, masses of crystals will form on the bottom, and these are somewhat difficult to bring into solution. When all the contents of the steel drum are in the water and the temperature has returned to normal, this stock liquor should stand at 55 to 60° Be.

Chemists Differ on Acidity

The bath for the goods is made by diluting the stock liquor to 28° Be. At this point there is a difference of opinion as to the acidity of the bath. Most Swiss chemists avoid any acidity whatever, while most French and Italians work with a slightly acid bath. By adding two pails of commercial hydrochloric acid to the stock bath of strong tin the working liquor keeps fairly close to 60% of acid, which gave us good results. It may be said, however, that conditions will vary in every plant, and that the water used is really the determining factor. Each operator must adjust his operations to the local conditions, and when good results are obtained aim to hold to those conditions.

Silk immersed for one hour in the 28° tin liquor will absorb a certain amount. The first pass is always much lighter than the subsequent passes. Many kinds of machines are in use, but we had only a rubber-lined box into which we put the bundles, covering them with a wooden lattice to prevent floating. I never had a clouded or streaky piece done in this way; but, of course, georgettes and flat crepe would not be so difficult as goods with satin face or stripes.

At the end of an hour a trough lined with sheet rubber was extended over to the "whizz"—a rubber-lined hydro-extractor—and laborers with rubber gloves and aprons slid the bundles into the basket. The discharge from the whizz went into a pit, which was a large earthen crock sunk in the floor. While the lot was whizzing, the liquor was returned to the box, except two pails which were put in reserve in carboys. Two pails of strong liquor brought up the level in the box and strength again to 28°, ready for the next lot, which went into the tin at once. Everything must follow in regular procession and not a minute is lost. In fact, it is best to operate day and night; but we only made about twelve hours a day.

As soon as the goods out of the tin are whizzed dry they are put on the tin-washing machine. There is a tradition that the wash water is better if it is cold, hard well-water, but we found the city water to give us far better results. As soon as water strikes the tin in the silk there is an immediate formation of a hydrated oxychloride which further washing changes to meta-stannic acid. If the goods are too acid some will leach out and wash away, and yet some acidity is necessary to get level results. If the water in the first box does not show washed-out tin to any great extent, the conditions are favorable.

The goods go through four boxes and do not show an acid reaction, but if allowed to lie for several hours will redden litmus instantly. Theoretically there is no acid left, but as a fact the reactions have been more or less surface reactions and no doubt there is a little core of oxychloride in the center of each fiber, just like the lead in the center of a pencil. In order to complete the hydration, some use a warm or hot water in the last box. We only warmed it slightly, but that was to prevent the icy water from numbing the hands of the men who were making up the bundles.

The Phosphating Operation

To make safe and to gain extra weight, the goods are now phosphated.

There are machines, somewhat like washers, through which the goods pass, requiring about five minutes to make the journey. Much phosphating is done in iron hydro-extractors for half an hour or more. We ran twenty pieces at a time on a regular piece-dye machine in 6° phosphate of soda for a full hour. The phosphate must be just neutral to phenolphthalein. I have never had any data from the hydrogen-ion operators, so I cannot say what its pH value should be. This is an important point, however, and must be adjusted by either soda or acid, according to its needs.

The phosphate bath converts the oxides of tin into phosphates, thus stabilizing the weighting and materially increasing the weight.

After phosphate the goods are run through the washer. The first two boxes should contain hot soft water, the next cold water and the fourth acid water. A thorough whizzing follows and the goods are ready for the next pass in the tin.

While we never had any trouble on account of leaving phosphated and soured goods overnight after two passes, I have seen some very bad spots develop at this stage; but that was where the phosphating was done in a machine and had only five minutes' phosphate action as against one hour's treatment. If there was a core of acid tin in the center of the fiber, a short phosphating might not be able to reach it.

After three passes the goods are about 18 to 20% over par; that is, we have made up the 25 to 30% boil-off and are that much over the weight of the raw goods.

The trade wants 25 to 40% weighting, and this extra is easily put on by a half hour in silicate of soda at 120° F.

From 1 to 8° Be. will give the extra weight; but, of course, the more silicate the stiffer and less yielding the goods will be. Some are satisfied to load all the silicate

into the goods that is possible, and then try to soften them with more oil in the finish. After a few pieces split down the middle on the finishing frame while trying to get back to width, they generally give orders to go easy on the silicate and not try to exceed 25% weighting.

There is another final pass used in some places, but it is more popular on skeins than on pieces—i. e., basic aluminium sulphate.

A Scheme for Greater Production

The work went ahead merrily and we were getting the pieces out as fast as the little plant could handle them; so, of course, the thought was to get in shape for more production. Full-width weighting machines and washers were too much of a step right off, so orders were given for fine large machines of the hydro-extractor type —a rubber lined one for the tin and plain iron for phosphate. New tanks, rubber pumps, exhaust and agitation for the strong tin liquor and everything that would make the operation a success. Now the mess began—holes for foundations, concrete mixing, setting tanks—everything that could make a mess or a crowd, yet through it all we kept up production without a single complaint as to quality.

About this time the old bird came to me in his most suave manner and said, "We have to get greater production." "Well," I said, "so many yards an hour can go through the process so that production depends on how many units we have to do the work in." "Surely, I know that," he grinned, "I mean we will have to run the whole twenty-four hours." "Fine," I grinned back, "but I am only human and can't be here the whole day and night." "That's just what I was coming to; I have two fine young fellows you can have as foremen. Train them so that they can run the job for you, then you can take it easy. Come in at 10 in the morning instead of 6 and stay with the day man till 2 in the afternoon and then go home or to the movies; then come over about 8 in the evening and stay till about 2 a. m. with the night man. See how simple it is?"

Well, I fell for this scheme and made a good job out of the two fellows. They learned rapidly and were posted on all the perils and pitfalls of the operation, and I could safely leave it in the hands of either without fear of anything going wrong. About this time the new machines were ready to run. We started the motors and instantly everything in the plant stopped and the engineer came running to see what had blown the main fuses on our power line.

They had figured that we had power to spare, but the starting load was well in excess of our capacity, and new transformers and lines had to be arranged for. This meant six weeks, at least. Using this excuse and the possible loss of business through inability to operate, I was handed my final check with the explanation that they couldn't afford to go on now. When I left, one of the partners left also, because he knew what the scheme signified. In a week or so there was plenty of work on hand and they adopted the simple plan of running the tin weighting at night and using the power in the daytime for the dyehouse.

My two proteges were retained at low wages and did well till emergencies arose; one was fired and the other kept on. Later a new tin weighter was hired who changed everything and ruined several thousand dollars worth of goods. Finally, in disgust, they abandoned weighting altogether, and the last I heard of them was a press notice of an appeal for the appointment of a receiver.

Two thousand years ago Aesop said: "No matter how much you may sweeten it, it is still applesauce."

OPINION IN JAPAN CONFLICTS OVER DYE PACT WITH GERMANY

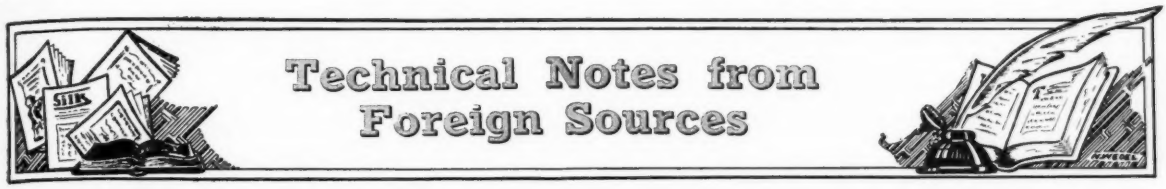
Opinions in the Japanese dye trade differ as to the effect on the industry of the agreement made with Germany. Some see in it a blow to the industry, already suffering from competition, while others view the agreement with satisfaction as tending toward trading. The committee to be appointed and to serve as part of the treaty mechanism is to be allowed only to make recommendations as to importation of particular dyes, final decision to rest with the department of commerce and industry. The agreement will not, the Doitsu Senryo Kaisha says, affect the Japanese industry seriously.

A different view is taken, however, by the trade. Except for some sixty different dyes, whose importation is to be discussed by the committee, all German dyes may be imported with no restriction. In the expectation of the agreement being arrived at, a large shipment was made some time ago, it is alleged, and this is now held in China. Many consignments have been bonded at Kobe since December. The enforcement of the agreement will be followed by early selling of these stocks.

There is indication, says the Japan Chronicle, that Japan will be a focus of competition, as in China where German manufacturers are desirous of regaining their lost footing in the world's markets, while the United States, France and Switzerland, will push on in China and Japan. "In these circumstances," it says, "the certificate of origin required will have no practical effect in protecting the home industry, on which the pressure will be all the stronger when the agreement becomes operative."

Pfaltz & Bauer, Inc., New York, have recently increased their warehousing facilities by leasing from the Pfaltz & Bauer Realty Company the four-story building at 301 Pearl Street, opposite their offices and warehouse at 300 Pearl Street.

The offices of Pfaltz & Bauer will naturally remain at 300 Pearl Street, and the additional warehouse will afford them greater opportunity for carrying spot stocks of the various European products which they distribute to the chemical and essential oil trades in this country.



Stabilized and Dry Diazo Salts

I. G. Farbenindustrie A. G., English Patent No. 246,-181.—The diazo salts of unsulphonated bases, particularly those of the others of nitro-amino-phenols, can be stabilized by conversion into the salts of naphthalene-1-5-disulphonic acid. The products rapidly separate out pure and can be easily dried. They are readily soluble, particularly when mixed with the metallic salts of acylsulphonic acids, and can be used for direct printing upon prepared cotton. Suitable preparations for dyeing or printing are obtained by mixing the naphthalene-sulphonates of the diazo salts with magnesia, oxide of zinc, chalk, or the carbonate or bicarbonates of the alkalies

Stable Mixtures of Vat Dyestuffs

Ciba, English Patent No. 250,251.—Solid, stable preparations of vat dyestuffs can be prepared by mixing intimately the dyestuff with a non-caustic alkali, e. g., carbonate, borate, or phosphate, together with hydrosulphite, and, if necessary, a dispersive agent, such as Turkey Red oil, or sulphite cellulose liquor. The products are easily soluble in water, and particularly convenient for dyeing wool.

Discharges on Indanthrene Dyeings

Dr. H. Gossler, Melliand's Textilberichte 146, 9 (1928).—The printing of discharge effects upon goods dyed with Indanthrene dyestuffs has presented great difficulties, and up to recently has been avoided in practice wherever possible. With the increasing popularity which these dyestuffs enjoy, and their steadily greater use, the printer has been obliged to deal more extensively and more carefully with the problems which this desirable method of use presents. While not so many years ago the number of Indanthrenes which could well be discharged was limited, the recent great increase in their number and improvements in the discharge process in general have advanced the subject in importance considerably.

The common Indigo discharge with Rongalite and Leucotrope has been used for this purpose, with more alkali to increase the reducing effect. Addition of anthraquinone has proved to be of no use. Zinc oxide has a favorable effect, but is not indispensable as in the case of Indigo discharges. The usual discharge paste consists of about 300 g. of Rongalite CL, about 200 g. of caustic soda lye of 45° B., and the requisite thickening. In several cases Leucotrope W conc. is also added. In many dyeings even so strong a discharge paste does not give a clean white, and the goods must be previously prepared with Leucotrope W conc., which, of course, increases the cost of labor. The author's efforts have been directed first of all toward a possible improvement of the discharge paste. It has been found that addition of certain substances, as Dissolving Salt B, pyridine, Nekal, Ordoval, "Curacitnatron," Glycin, etc., as well as zinc oxide or kaolin, have produced some improvements in results, but so slight as to make them hardly worth while. The discharge recommended by the I. G. Farbenindustrie A. G., with reduction of the caustic soda from 300 g. per kilo to 100-150 g., a reduction which obviates liquefaction (too great) of the paste, proved to be about the best.

But experiments with available Indanthrenes has shown that a considerable number of them can be discharged well with a completely neutral discharge paste, and some Indanthrenes also give better whites with a neutral than with an alkaline discharge. The manner of dyeing is also of much importance. Goods in which the dyeing has not penetrated completely discharge much more easily to a satisfactory white than those in which the dyeing has penetrated completely to the back; this fact is confirmed by experience with mercerized goods, in which penetration is more difficult, and discharge printing to a satisfactory degree is more easy than with unmercerized cotton. The method of aftertreatment is also of importance. A thoroughly boiling soap bath is requisite in all cases; the longer the boiling the better the results. No average can be given as to the proper duration of the soap boil, but many Indanthrenes require about ten minutes to insure a clean white. Before the soaping the goods are given a long pass through boiling water, which must be regularly renewed as needed, in order to avoid the formation of a weak vat through solution of the Rongalite and caustic from the goods. In general, the addition to the bath of a little caustic lye or water glass, about 1-5 c.c. per liter, gives favorable results.

Addition of various solvents, as Pyridine, trioxyethylamine, or cyclohexylamine, to the soap bath make it possible to obtain, in the case of some Indanthrenes, a white discharge with previous preparation, but so much has to be added, and the time required for the treatment is so much longer, that at present the results seem valueless, unless to suggest that the matter is worth looking into further. Steaming the goods is also of value and importance. Experiments were made involving various temperatures, pressures, and humidities. The humidity does not appear to be of so much importance as in the case of Indanthrene direct printing. A steaming such as is given for most Rongalite discharges is sufficient. Further, a higher temperature in steaming favors a clean discharge.

Several tables are given, classifying the Indanthrenes

(of German manufacture), as to whether they discharge white (1) with a neutral Rongalite CL discharge paste, without previous preparation of the goods, (2) with an alkaline Rongalite CL discharge paste without previous preparation, (3) as in (2), but only when a strong (concentrated) dyeing has preceded, (4) as before, only with a previous preparation of the goods with Leucotrope W, and (5) those which do not give a good white under any circumstances. Formulae are also given for discharge pastes suitable for Indanthrenes of each of the five groups.

Printing of Turkey Red on Unprepared Fabric

Sealed Note No. 1886, *Soc. Ind. Mulhouse, deposited March* 1, 1909, *by La Manufacture Scheibler; L'Ind. Chim. et Rev. Gen. des Mat. Col.* 12 (*I. C.* 28), 15, 1928. —Starting from the assumption that, in printing Alizarine Red upon a fabric not prepared with oil, the latter should be put on in a form in which it will not combine with the mordants at the ordinary temperature, Arthur Liszkowski has found that the compound formed between ricinoleic acid and aniline fulfills that condition. The compound, at ordinary temperatures, is entirely inactive in the presence of the mordants, and at a higher temperature decomposes by hydrolysis into its components, which then enter into reaction.

The compound of ricinoleic acid with aniline is preferable to that of sulphoricinoleic acid, the red being more handsome. As to the salts of aluminium, those of organic acids are preferably used, and, beside these, the sulphocyanides, which give a very lively red. To obtain a good red, it is sufficient to add to the printing paste from 10 to 15% of the oil preparation, acidified with lactic or formic acid.

The red of the specimen (supplied with the sealed note) was prepared as follows:

Acid Starch Paste (see below)	45.3%
Alizarine 1D 20% B. A. S. F.	3.0
Alizarine GFX 20% Bayer	12.0
Aluminium Sulphocyanide 15°	10.0
Aluminium Nitrate 15°	3.0
Calcium Acetate 15°	8.0
Tin Oxalate 16°	1.2
Tartaric Acid 15/100	2.0
Formic Acid 60%	3.5
Oil Preparation (see below)	12.0

Acid Starch Paste

Wheat Starch	26.0
Acetic Acid 5° B.	23.0
Water	51.0

Tartaric Acid 15/100

Tartaric Acid	1.5 parts
Water	8.5 parts

After printing the goods are steamed for two hours without pressing, washing, or soaping.

The oil preparation is made by saponification of castor oil with caustic soda, then decomposition by hydrochloric acid of the soap formed, and the resulting ricinoleic acid, after being washed well, is boiled (300 parts) with 95 parts of aniline until the formation of a clear oil, which is completely soluble in ammonia water. The preparation can be used as soon as cool.

Report Upon the Above by P. Wilhelm.—The process, which the above sealed note has as its purpose, is based upon the use of a combination of ricinoleic acid with aniline, insoluble in water, but forming with the thickening agent an emulsion which, in presence of formic acid, does not bring about a precipitation of the mordants contained in the printing color. The combination of ricinoleic acid with aluminium and calcium is not brought about except by steaming, and then simultaneously with that of the alizarine. Under these conditions the red is as lively and as fast to soap as that obtained upon a prepared fabric.

The part which aniline plays does not appear to be clearly defined. Rincinoleic acid should be liberated in the form of an emulsion, and the aniline should then, on steaming, act principally as a neutralizing agent, in combining with the acids resulting from the decomposition of the aluminium mordants, which the quantity of calcium acetate contained in the paste would not be sufficient to neutralize; without aniline, the fabric would be attacked, on steaming, especially in working with lots containing a large color-area.

Trials have confirmed the claims made in the sealed note. The red does not perceptibly differ from a normal steamed red, either in liveliness of hue or in fastness to soap.—(*Translated.*)

Black Vat Dyestuffs

H. T. Bucherer, English Patent No. 252,745.—An aromatic nitroamine or primary amine, or a mixture of these, particularly of anthraquinone derivatives, is heated with concentrated sulphuric acid, the mixture being in the proportion of 1 to 2. The products are black dyestuffs.

See also, in this connection, an article by Bucherer and Maki (Ber. 2068-2078, 60, 1927), where it is stated that such dyestuffs are produced by heating an aromatic primary or secondary amine with a nitro-compound in presence of concentrated sulphuric acid, at about 200° C., for six hours. Anthraquinine derivatives for amino-compounds, and nitrobenzene or meta- or para-nitroaniline as nitro-compounds, are most suitable. Nitronaphthylamine, or nitro-anthraquinone, or dinitro-compounds, do not give good results. Sulphur dioxide is normally evolved during the heating, but if the reaction is allowed to become too vigorous, ammonia is split off. The best proportions between amino and nitro-compounds lie between 1 to 2 or 1 to 1. Most of the products are insoluble in ordinary solvents, but very easily soluble in alkaline hydrosulphite solution, giving a brownish-yellow vat. They appear to be anthrimides. The products from

alpha-amino-anthraquinone have less affinity for cotton than those from the beta-compound. Two possible formulae of high carbon content (C = 60) are given for the product from beta-amino-anthraquinone, nitrobenzene and sulphuric acid.

GROWTH AND PLANS OF IMPERIAL CHEMICAL OUTLINED IN FIRST REPORT

Sir Alfred Mond Reviews with Satisfaction Results of Year's Operations, Relations with Labor and Foreign Interests, and Research in New Fields

AN extremely bright outlook is reflected in the tone of the annual report of the Imperial Chemical Industries, Ltd., most powerful consolidation of interests in British industry. A palpable note of optimism runs through the entire review of the first year's progress of the firm as presented at the recent annual meeting by Sir Alfred Mond, chairman of the board. The final growth in the first year has exceeded all anticipations; labor conditions have been close to ideal; the international relations of the I. C. I. have led only to friendly and valuable contacts; and future activities will embrace projects in several new fields.

On the basis of the earnings of the four participating companies and their subsidiaries, Sir Alfred stated, and after making due provision for reserve, the future income of the new company should exceed £4,000,000. This total, he said, does not include £1,000,000 of the capital appreciation gained through the sale of securities, which has remained in the accounts of subsidiary companies, nor does it show the large amounts set aside for maintenance of plant and for obsolesence and depreciation.

Labor Conditions Excellent

Relations with the trade unions in the chemical industry, Sir Alfred Mond pointed out, have been of the friendliest nature for many years. "In fact, I think we may be proud of our record; for over two generations we have not known stoppages due to labor disputes, strikes, or lockouts.

"The increase in the magnitude of the business should not be allowed for a moment to interfere with what is of vital importance to an industrial concern, namely, its friendly relations with those who represent labor trade unions, and their personal contact with those who work with them in factory or in shops."

"As regards international relations, the chairman said that reports in the press have considerably exaggerated the actual facts. "Naturally, a company of our magnitude and our history has very important relations, both on the Continent and in America, with important industrialists carrying on similar and allied operations," he said. "That is nothing new, it is a thing which always existed and I hope always will exist. We have friendly relations with the great Allied Chemical Company of America, of whose board I have the pleasure to be a member. It is a very ably managed business, and I am glad to think we have a large stock interest in that company, which is carrying on similar business. With Sir William Billings we are allied in many directions and also with Du Pont de Nemours, the most outstanding firm of chemical explosives makers in America and elsewhere. These relations and others are of the utmost value to your company, and to corporations of our kind.

Day of Scowling Competitors Past

"As a matter of fact the world is changing a great deal in business. The old idea of the heads of great businesses meeting each other with scowls, and shaking their fists in each other's faces and engaging in trying to destroy each other's business may be very good on the films, but it does not accord with any given fact.

"A good deal has been said during the course of the year about the great German company, the Interessen Gemeinschaft. I am glad to think that I have during the year had a number of conversations and made contact and acquaintance with the people who manage that huge concern, and that, while it is very far from the truth, as I have frequently seen it stated, that all kinds of agreements have been come to, those relations in many directions and those contracts have proved of value, and I think, will, as time develops, probably be more useful still.

Guardian of National Safety

"I want to declare categorically, and once and for all, that this company will never make any understanding or agreement which will in any way hamper the legitimate development of its activities either in this country or the British Empire. We have laid it down as a cardinal fact that the British Empire and Great Britain are one and indissoluble. We lay it down as a cardinal fact that we are the guardians of the national safety in the way of the production of chemical products, that we are the guardians of the development of the chemical industry of this country and of the Empire, and that no considerations whatever, monetary or otherwise, would ever allow us to adopt a policy which would inflict any damage upon this great trust which is imposed on us."

Further development of the company's fertilizer output in its new plant at Billingham, which is producing nearly four times the synthetic fertilizers this year that it produced last year, was predicted by Sir Alfred. Other important developments at Billingham were forecast. "We are manufacturers there of ammonia products and nitric acid, and we expect shortly to be putting into operation a plant to manufacture methanol, a very important raw material of our dye industry which we now have to import at great expense, and also to develop those synthetic products with the new high pressure and other appliances at our disposal. In fact, we are only at the beginning of a new field of chemistry, and connected with that I want to say a few words on the important subject of oil from coal. It is obviously one of very great im-

portance from the point of view of national and imperial defense. We have been studying this problem for some time and not long ago I saw the first petrol produced from coal on a small scale in our laboratories at Billingham. Our problem is not quite the same as that of the Germans, who are working from brown coal; but we are proceeding with it, and we are satisfied that the technical solution can be found."

With regard to the Finance Company of Great Britain and America formed by Imperial Chemical Industries and the Chase Securities Corporation, Sir Alfred said only that "the idea of forming this company was a result of conversations which I and the president (Sir Harry MacGowan) had with representatives of great financial institutions over there, the object being to bring the great capital strength of America to the use of industrial purposes in this country, the Empire, and the world. You are fifty-fifty in this company, and, personally, I feel convinced that, as we continue our operations, you derive a very reasonable profit from your investment in this corporation, and that industry generally will benefit by a combination which is almost unique, I imagine, with the personnel involved in their knowledge of finance and industry on both sides of the Atlantic."

NEWPORT ANNOUNCES A VAT BROWN

Newport Chemical Works recently announced the commercial production and availability of a vat brown to be known as Anthrene Brown RA. It is the equivalent of the products classified in the Colour Index as No. 1,151, which are, as all fast color dyers know, types of great importance in their field. The tans produced are practically staple shades of brown with most dyers and the ease of production of them with this type makes it a perennially popular color. The type is known, according to the announcement, for its great fastness to light, which makes it useful for materials to be used for draperies, upholstery fabrics, and the like.

In addition to light fastness it is said to possess all the desirable resistance to other color destroying influences that characterize the anthrene group, and therefore to be important for the production of shirtings and other fabrics which must endure repeated visits to the laundry. Its ease of reduction, excellent leveling properties, and the fact that it is practically uneffected by metals make it particularly suitable for machine dyeing. As vats are obtained with relatively small quantities of alkali, silk as well as cotton and rayon can be dyed without injury.

Leaflets showing dyeings and giving directions for application may be obtained direct from the company.

DU PONT PRODUCES NEW COLORS FOR TIN-WEIGHTED SILK

A series of colors developed and offered exclusively for the dyeing of tin-weighted silks has just been placed on the market by the Dyestuffs Department of E. I. du Pont de Nemours & Co. The dyes in this series are to be known as the Setamine colors. They are described as fast to scooping, perspiration, water and mild soaping, and as assuring full penetration of tin-weighting. All of these colors can be used as self colors or in combination to produce a wide range of shades, dyeing evenly in all strengths from delicate to full tones.

The range is now complete as follows: Setamine Yellow GG, Yellow G, Yellow GR, Orange G, Orange R, Brown 3G, Brown CG, Brown CR, Brown GN, Brown 5R, Red Brown, Scarlet B, Scarlet 3B, Red BD, Red G, Red B, Pink, Gray, Violet B, Blue G, Green G, Green B, Blue R, Navy Blue, Fast Blue GR, Black G, Black Extra and Black B.

The rate for "Position Wanted" advertisements in this column is 2 cents a word—with a minimum of 50 cents per insertion. For all other types of advertisements—i. e., help wanted, machinery or supplies for sale—the rate is $5.00 per column inch or less per insertion.

SALES MANAGER

Sales manager wanted for Southern territory by well-known manufacturers and importers of dyestuffs, finishing materials, etc. Excellent opportunity for experienced man familiar with trade in the Carolinas, etc. Apply in strict confidence to Classified Box 463, American Dyestuff Reporter.

POSITION WANTED

Technical chemist, college graduate, age 30, married, twelve years' laboratory and practical chemical experience, is available for position with a progressive concern. Thorough knowledge scouring, bleaching and dyeing yarns and piece goods, all classes dyestuffs and application of same to all fibers; microscopic and chemical analysis yarns, chemicals, dyestuffs, oils, soaps, etc. Will furnish best of references. Address Classified Box 466, American Dyestuff Reporter.

CASH

For a vertical set of about 32 dry cans, about 74-inch face, in good condition, and mangle to match. Also for a Proctor & Schwartz automatic loop dryer for 72-inch goods. Address Box 464, American Dyestuff Reporter.

SALESMAN WANTED

With knowledge of ducks and filter fabrics, and an elementary knowledge of chemistry; travel and office work. Must be under 30, Protestant, with high or textile school training. A good opportunity for the right man. Address Box 465, American Dyestuff Reporter.

DYEHOUSE CHEMISTS

The Celanese Corporation of America has openings for chemists in their Experimental Dyehouse. Some experience desirable but not essential. Applications should be addressed to Box 444, Cumberland, Md.